1974

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1.109
6625-971-0347

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83

TECHNICAL MANUAL

OPERATION AND MAINTENANCE

SWEEP SIGNAL GENERATOR

MODEL 1974

(HAZELTINE)

AF33(600)40874

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SECTION IX

DIFFERENCE DATA SHEETS

The instructions contained in preceding sections of this technical manual apply except for the differences given in this data sheet.

9-1. INTRODUCTION.

9-2. This difference data sheet covers the differences between the Sweep Signal Generator Model 900B and the Sweep Signal Generator, Model 1974, both manufactured by Jerrold Electronics Corporation, Philadelphia, Pa. Figures 9-1 and 9-2 show front and rear views of the 900B.

9-3. DIFFERENCES IN MODELS

9-4. The Model 1974 and Model 900B are basically the same electrically and functionally. The 900B differs from the 1974 in that certain rear-chassis connections and controls on the 900B have been paralleled to provide front panel appearances of the same connections on the front panel of the 1974. The following connections and/or controls appear only on the rear panel of the 900B, and on both front and rear panels of the 1974:

SCOPE HORIZ
SCOPE VERT
EXTERNAL MARKERS

9-5. The EXTERNAL MARKERS connections on the front panel of the 1974 are labeled MKR INPUT.

9-6. The External Detector Input control is not labeled on the rear panel of either the 900B or the 1974. It is located on the preamplifier chassis immediately above the SCOPE VERT connector. On the front panel of the 1974 it is labeled EXT DET INPUT.

9-7. The REAR PANEL - FRONT PANEL switch which selects rear panel or front panel external detector input on the 1974 is not used on the 900B.

9-8. The EXT DET - INT DET switch on the preamplifier chassis of the 900B serves the same purpose as the DETECTOR EXT. INT. switch on the front panel of the 1974.

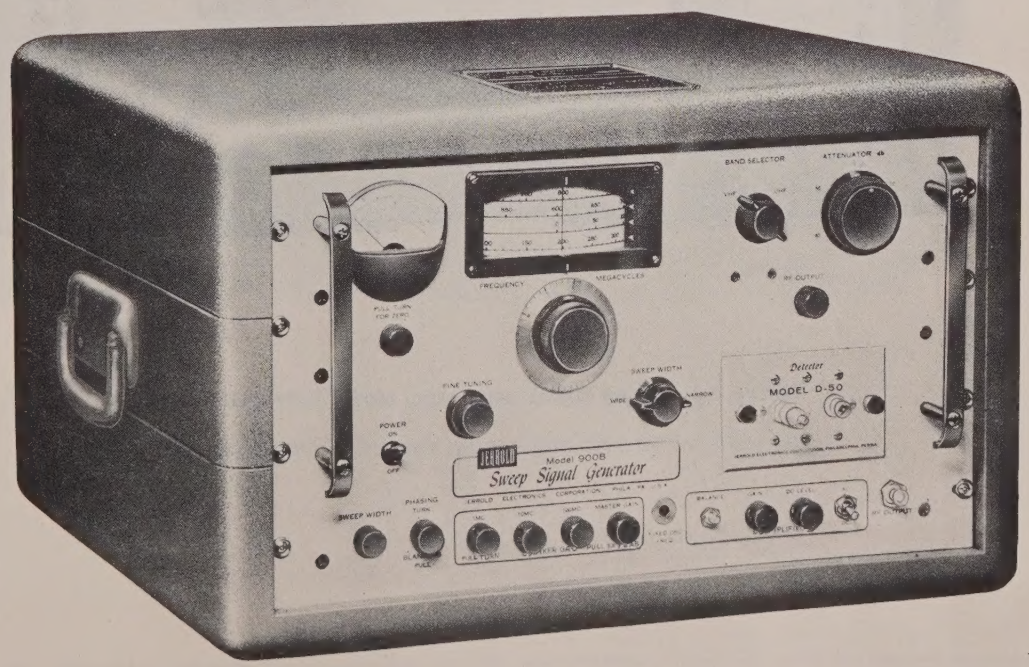

Figure 9-1. Sweep Signal Generator, Model 1974, Front View

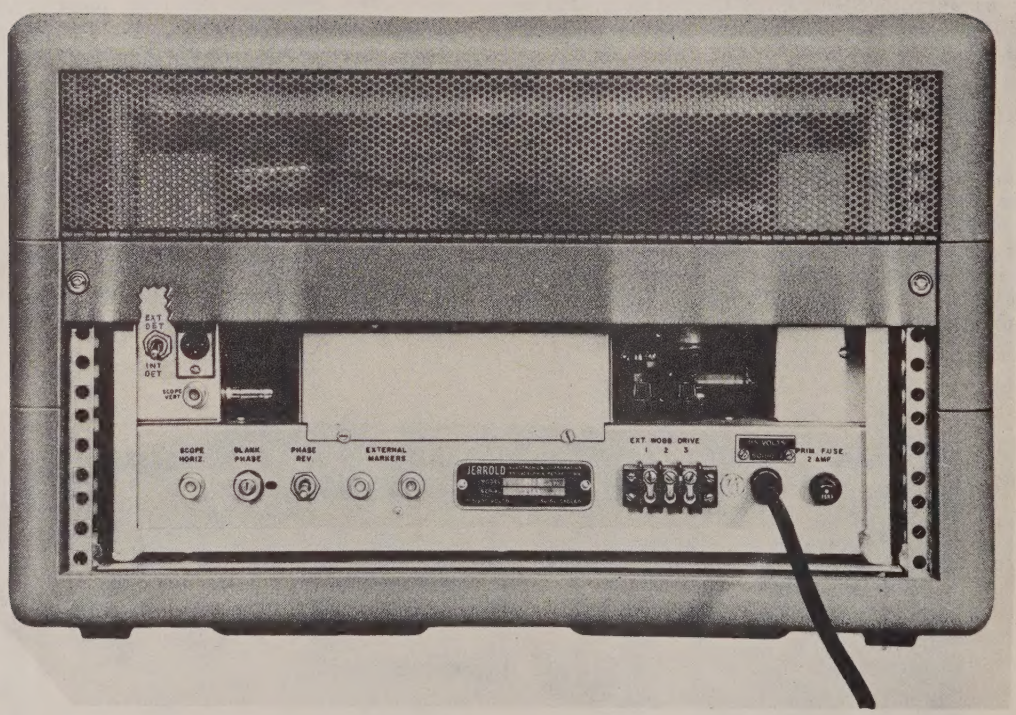

Figure 9-2. Sweep Signal Generator, Model 1974, Rear View

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SECTION I

INTRODUCTION AND DESCRIPTION

1-1. INTRODUCTION.

1-2. This handbook covers the operation, maintenance and calibration of Sweep Signal Generator, Model 1974, manufactured by Jerrold Electronics Corporation, Philadelphia, Pa., for the Hazeltine Corp., Little Neck, N. Y. The instructions contained in this manual are for the guidance of personnel who are responsible for the operation and maintenance of this equipment. The complete equipment is shown in figures 1-1 and 1-2.

1-3. The Federal Stock Number of Sweep Signal Generator, Model 1974, is 6625-971-0347.

1-4. PURPOSE.

1-5. The sweep generator is used in conjunction with an external oscilloscope to measure frequency response, gain and bandwidth of the following types of equipment designed to operate within the frequency range of 500 kilocycles (kc) to 1200 megacycles (mc):

a. Receivers and receiver subassemblies.

b. RF, IF or video amplifiers.

c. Filters and transformers.

d. Cavities and resonant circuits.

1-6. An auxiliary use for the sweep generator and oscilloscope combination is the measurement of the sending end impedance of a loaded transmission line to determine proper matching.

1-7. Figure 1-3 is a table of leading particulars showing the capabilities and limitations of the sweep generator.

1-8. PHYSICAL DESCRIPTION.

1-9. The sweep generator, designed for bench operation, is constructed of a welded aluminum frame,

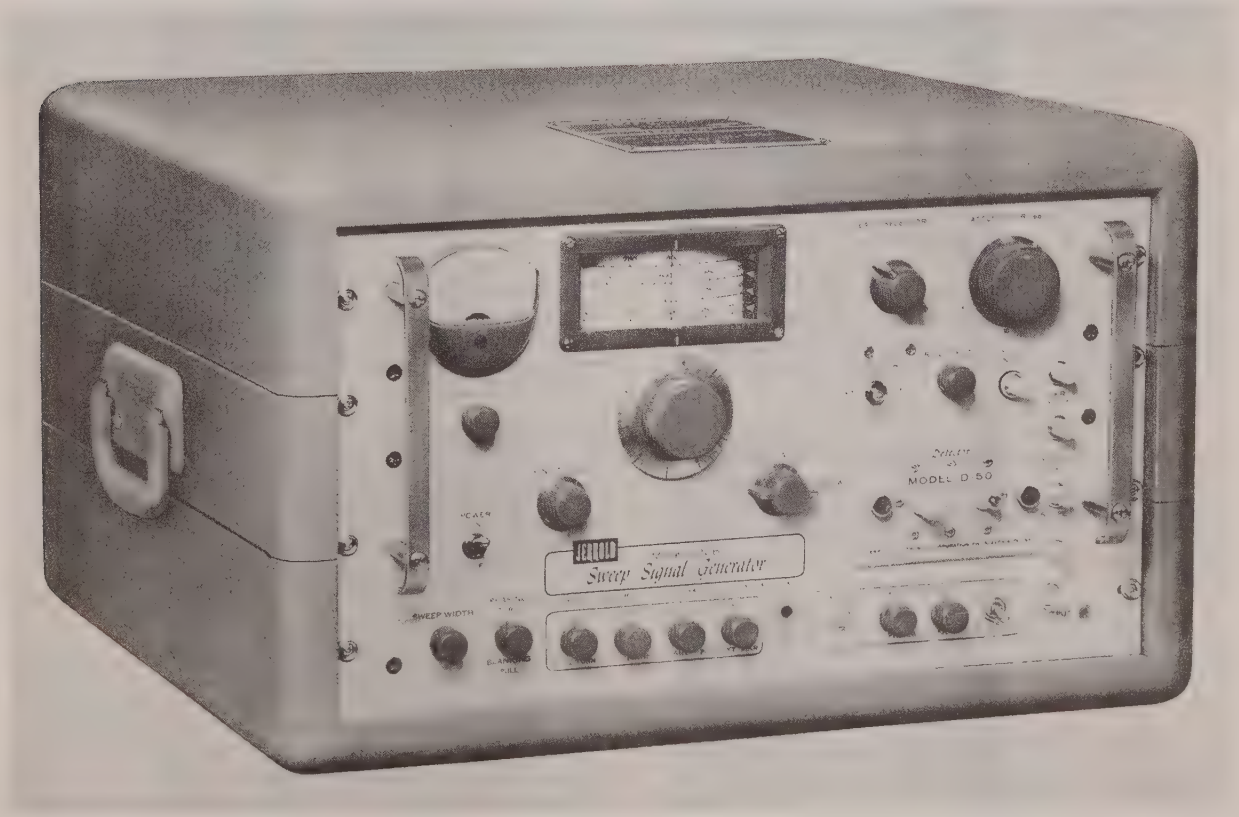


Figure 1-1. Sweep Signal Generator, Model 1974, Front View

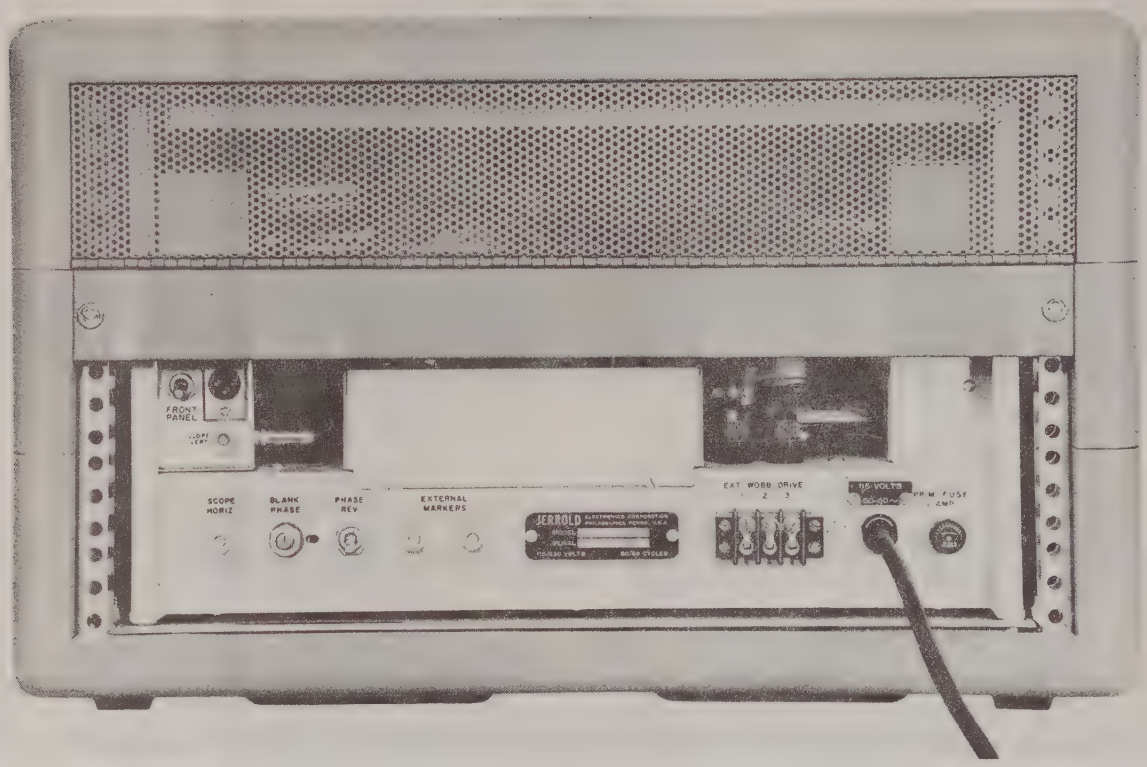


Figure 1-2. Sweep Signal Generator, Model 1974, Rear View

which holds the removable chassis units rigidly. It is surrounded by a heavy welded steel cabinet with a hinged cover, removable for maintenance. The front panel of the sweep generator contains the operating controls and jacks for connecting external auxiliary equipment. The rear panel contains additional jacks and terminals for connecting auxiliary equipment.

1-10. ELECTRICAL DESCRIPTION.

1-11. The sweep generator consists of a basic assembly with removable chassis units. Each chassis unit performs a group of closely related functions and is given a specific name according to its purpose. (Refer to figure 1-4 for a block diagram of the sweep generator.)

1-12. SWEEP OSCILLATOR. The basic unit of the sweep generator is the sweep oscillator, mounted in the main frame assembly. This sweep oscillator has three outputs whose functions are as follows:

a. The first output is connected to the UHF ALC (Automatic Leveling Control) detector, where it is converted to dc. This d-c voltage drives the VOLTS meter through the meter amplifier.

b. The second output is connected to the RF output through two alternate routes. The first route goes directly to the marker mixer unit, then through the RF attenuator. The second route goes through the VHF mixer, where it mixes with the 600-mc output of the VHF fixed oscillator. The output of this combination is cut off above 500 mc by means of the 500-mc filter (integral with the VHF mixer), is fed into the marker mixer, and through the RF attenuator, to the RF OUTPUT jack.

c. The third output is connected to the harmonic marker generator, where it mixes with various harmonics of the 1, 10, and 100-mc marker generators. This action results in low-frequency beats which are amplified by the marker amplifier and appear as frequency markers on the oscilloscope screen. Markers may also be introduced by feeding external signals into the external markers input.

1-13. WOBBULATOR ASSEMBLY. The wobbulator assembly is physically connected to capacitor C601, which is varied by application of line frequency voltage to the coil of the wobbulator assembly. The line frequency voltage is adjustable by means of the SWEEP WIDTH control, which provides an adjustable sweep width. The entire wobbulator assembly may be moved by means of the SWEEP WIDTH switch. This action meshes the sections of variable capacitor C601 completely or partially, providing a wide or narrow range, respectively, of sweep width.

Frequency range	VHF Wide: 500 kc to 400 mc VHF Narrow: 500 kc to 400 mc UHF Narrow: 350 mc to 1200 mc UHF Wide: 275 mc to 1100 mc
Sweep width*	VHF Narrow: 10 kc to 1 mc VHF Wide: 500 kc to 400 mc UHF Narrow: 10 kc to 1 mc UHF Wide: 500 kc to 40% of center frequency
Output voltage	VHF: 0.25 volts RMS or more into a 50-ohm load. UHF: 0.5 volts RMS or more into a 50-ohm load.
Output voltage variation	VHF ± 0.5 db at maximum sweep width • UHF ± 0.5 db to 800 mc, ± 1.5 db from 800 to 1100 mc, ± 2.5 db from 1100 to 1200 mc. (Output voltage variation less at narrower sweep widths.)
Spurious beats and harmonics	20 db or more below fundamental output.
Source impedance	50 ohms, with a VSWR less than 1.5 to 1.
Detector	Full-wave, peak-to-peak, feed-through type. VSWR less than 1.3 to 1 in the frequency range of 550 kc to 900 mc, and less than 1.4 to 1 in the frequency range of 900 to 1200 mc, with 50-ohm termination connected.
Linearity of sweep	▲ Within 5 percent of sweep width (in relation to the horizontal deflection voltage).
Horizontal frequency modulation	Obtained from power line frequency, shaped to sinusoidal form.
Horizontal deflection voltage	20 volts, peak-to-peak.
Markers (internal)	Crystal-controlled harmonic markers at 1, 10 and 100 mc intervals. Each marker group output is individually controlled from the front panel.
Marker input (external)	Requires 20 millivolts or more. Gain of amplifier is variable from zero to 100.
Oscilloscope preamplifier	Gain variable from 2 to 200 (46 db). A-c or d-c coupling to the oscilloscope input may be selected.
Attenuator	Adjustable from 0 to 50 db in 10 db increments.
Frequency dial	Calibrated in four ranges with an accuracy of ± 1 dial division: VHF Narrow: 0 to 450 mc VHF Wide: 0 to 460 mc UHF Narrow: 340 to 1200 mc UHF Wide: 275 to 1100 mc
Volts meter	Provides output voltage level measurement accurate within ± 1 db from zero to 400 mc.

Figure 1-3. Table of Leading Particulars (sheet 1 of 2)

Blanking	Return trace blanking is optional by means of panel switch. Blanks to zero voltage.
Power source requirements	100 to 130, or 200 to 260 volts AC at 50 or 60 cycles.
Power consumption	Approximately 100 watts.
Mounting	Mounted in enclosed metal cabinet, ventilated. May be rack mounted by removing cabinet.
Dimensions	Overall: 14 in. high, 23 in. wide, 20 in. deep. Less Cabinet: 10-1/2 in. high, 19 in. wide, 19 in. deep.
Working space required	24 in. by 24 in. minimum bench surface 36 in. vertical clearance (cabinet lid open) 18 in. vertical clearance (cabinet lid closed)
Shipping weight	100 pounds
Volume	3.67 cu. ft.

* Individual sweep generators will provide usable sweep widths beyond these frequency limits.

● As viewed with D-50 detector in the circuit.

▲ Linearity deteriorates somewhat at frequencies outside the 10 kc to 1 mc limits.

Figure 1-3. Table of Leading Particulars (sheet 2 of 2)

1-14. HORIZONTAL SWEEP DEFLECTION. Voltage for the horizontal deflection of the oscilloscope display is provided by filtering and phasing a portion of the line frequency output of the power transformer.

1-15. BLANKING CIRCUIT. A portion of the horizontal deflecting voltage is fed to a blanking circuit, where the deflecting voltage is amplified and shaped to provide a signal which may be used to eliminate the return trace on the oscilloscope display.

1-16. ALC AMPLIFIER. As the output of the sweep oscillator is varied by the wobbulator, variations in output amplitude are kept to a minimum by the ALC amplifier, which controls the cathode voltage of sweep oscillator tube V601.

1-17. MODEL D-50 DETECTOR. The output voltage of the equipment under test is fed through the Model D-50 DETECTOR, where it is converted to a d-c signal and fed to the preamplifier.

1-18. PREAMPLIFIER. The preamplifier amplifies the d-c signal from the Model D-50 DETECTOR, or from an external detector connected to the EXT DET INPUT jack, to provide adequate voltage for the vertical input of the external oscilloscope.

1-19. POWER SUPPLY. The power supply chassis provides all the necessary filament, plate and grid voltages necessary to operate the sweep generator, as well as the special voltages required for the wobbulator assembly and the horizontal deflection and blanking voltage circuit. The power transformer is a voltage regulating type which maintains constant voltage output with variations of supply line voltage up to ±25 percent.

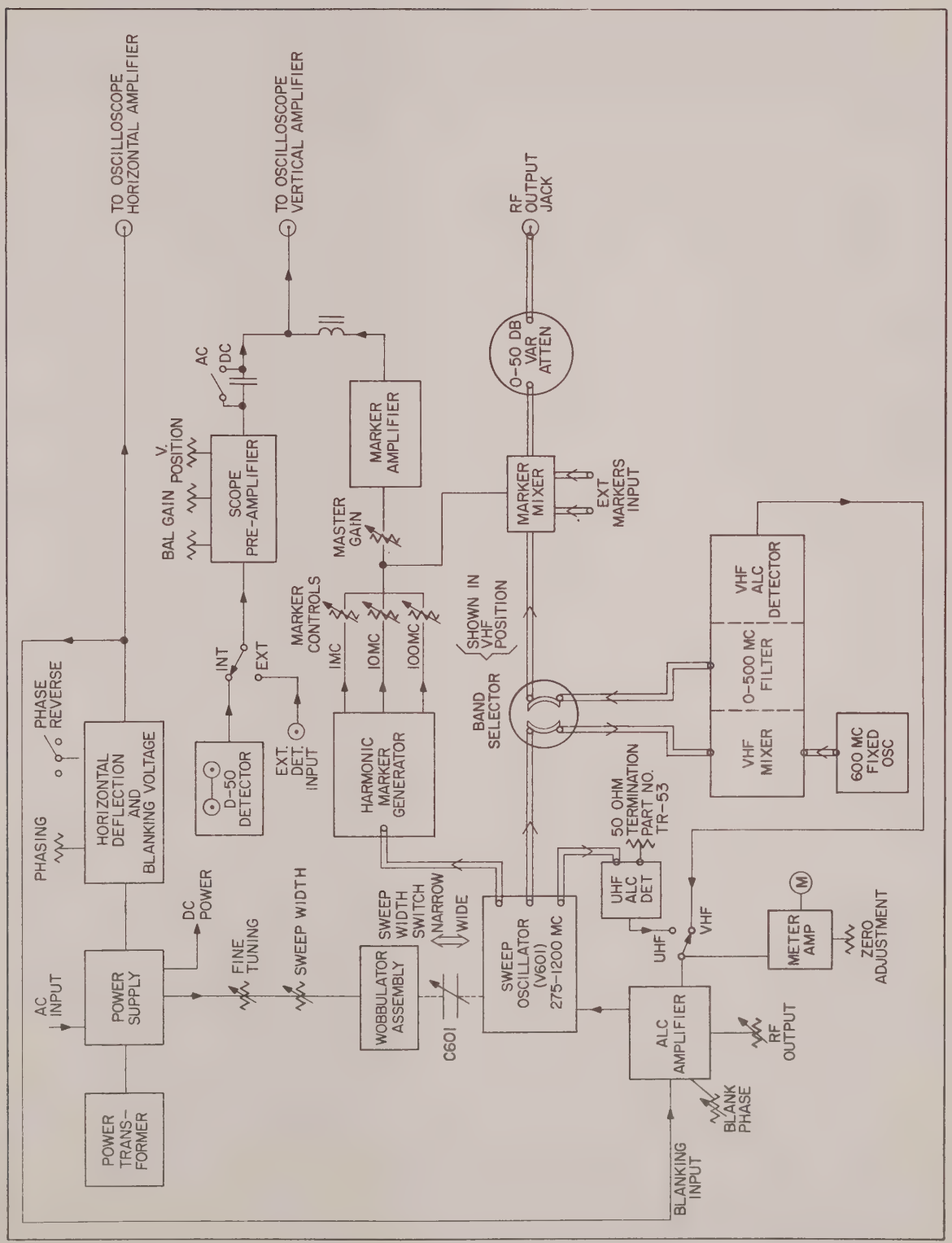


Figure 1-4. Block Diagram of Sweep Generator

SECTION II

SPECIAL SERVICE TOOLS

2-1. Special tools required for the repair and calibration of the sweep generator are listed in figure 2-1.

Figure No.	Part No.*	Nomenclature	Application
7-6	812-052	Sweep head alignment jig.	Supports sweep head in proper position for calibration.
7-8	812-050	Rack setting gage	Used to set the position of the tuning rack in relation to the frequency dial.
8-5	812-051	Shaft removal tool	Removes shaft locking nut on SWEEP WIDTH switch to enable removal of shaft.

*Part numbers are those of Jerrold Electronics Corp., Phila., Pa.

Figure 2-1. List of Special Service Tools

SECTION III

PREPARATION FOR USE, STORAGE OR SHIPMENT

3-1. UNPACKING PROCEDURE.

3-2. Select a clean location near the work area where the equipment will be used. Unpack the sweep generator carefully and lift it onto a workbench or table.

CAUTION

The sweep generator contains delicate mechanisms which cannot be expected to retain their accuracy if they are abused. Be careful when unpacking and handling the sweep generator.

3-3. REMOVING THE SHIPPING SCREW. The sweep oscillator is held rigid for shipment with a shipping screw (figure 3-1). Remove this screw and thread it into the adjacent hole provided for storage. Check that the sweep oscillator floats free on its rubber mountings.

3-4. INSPECTION PROCEDURES.

3-5. GENERAL. After unpacking the sweep generator, inspect the equipment to see that no damage has occurred during shipment.

3-6. EXTERNAL INSPECTION. Inspect the outside of the sweep generator (figures 4-2 and 4-3) for evidence of damage, usch as broken control knobs, bent knob shafts, broken meter face, or damaged cabinet.

3-7. INTERNAL INSPECTION. Raise the lid of the cabinet and inspect the interior of the sweep generator (figure 4-6) for evidences of damage, such as loose or broken tubes, loose screws, disconnected or loose connectors, or bent or damaged brackets and mountings.

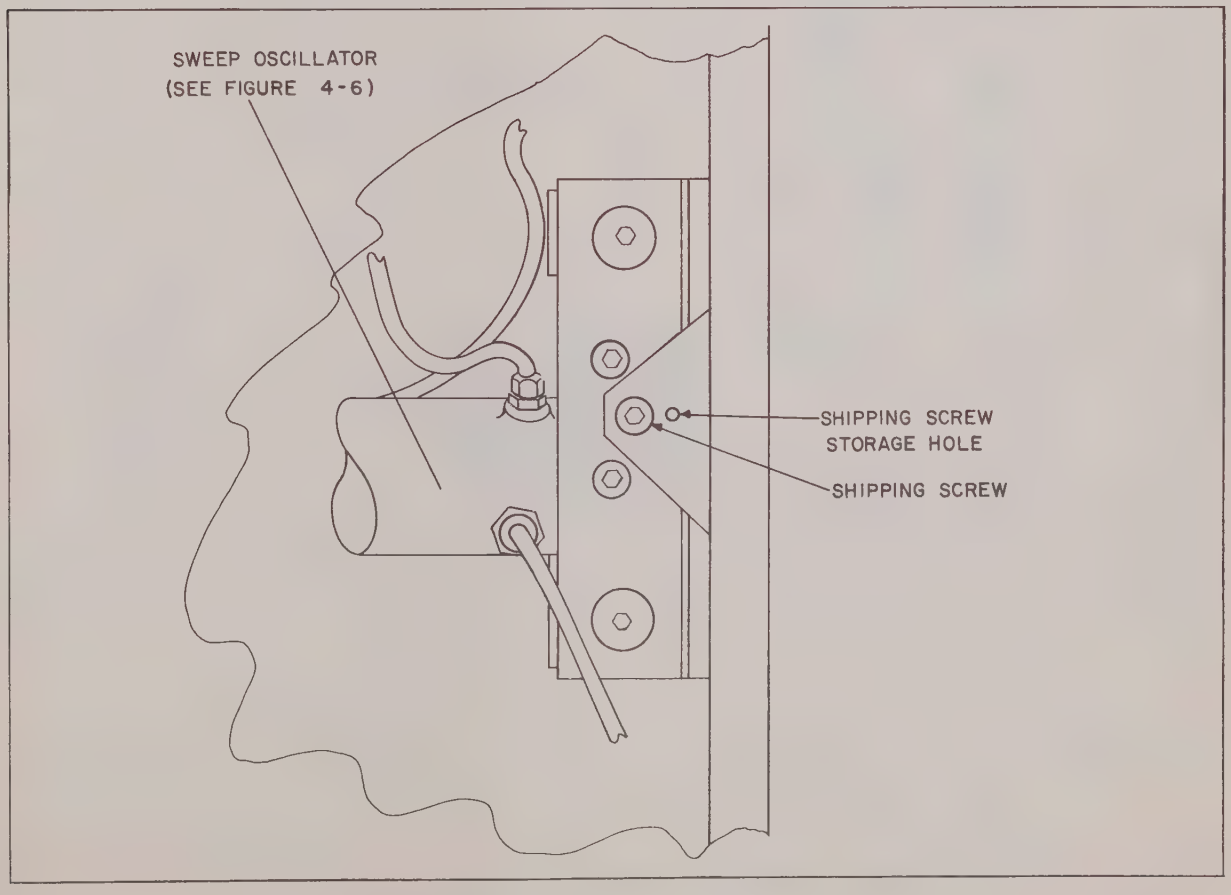


Figure 3-1. Location of Shipping Screw

NOTE

A type UG-88/U connector, P803B, is attached to the end of a cable and snapped into a retaining clip behind the front panel (figure 4-6). This cable is connected into the circuitry only when use of the EXTERNAL MARKERS jacks, J2B and J3B on the rear apron, is required. (Refer to paragraph 4-14.)

3-8. INSPECTION OF ACCESSORIES. Three accessories, a TR-53 50-ohm termination, a 1000-115 attenuator (20DB), and a line cord adapter are furnished with the sweep generator. (Refer to figure 3-2.) Make certain these accessories have been received and have not been damaged.

3-9. PREPARATION FOR STORAGE OR SHIPMENT.

3-10. PACKING PROCEDURE. Prepare the sweep generator for storage or shipment as follows:

a. Install the shipping screw, previously removed, to secure the sweep oscillator in a rigid position. (Refer to paragraph 3-3 and figure 3-1.)

b. Pack the three accessories (figure 3-2) in a suitable container.

c. Pack the sweep generator in a heavy cardboard or wooden container, surrounding it with at least two inches of cushion packing. Be certain to place the accessory equipment and instruction manuals in this container.

d. Pack the above inner container into a larger outside container, surrounding it with at least two inches of cushion packing.

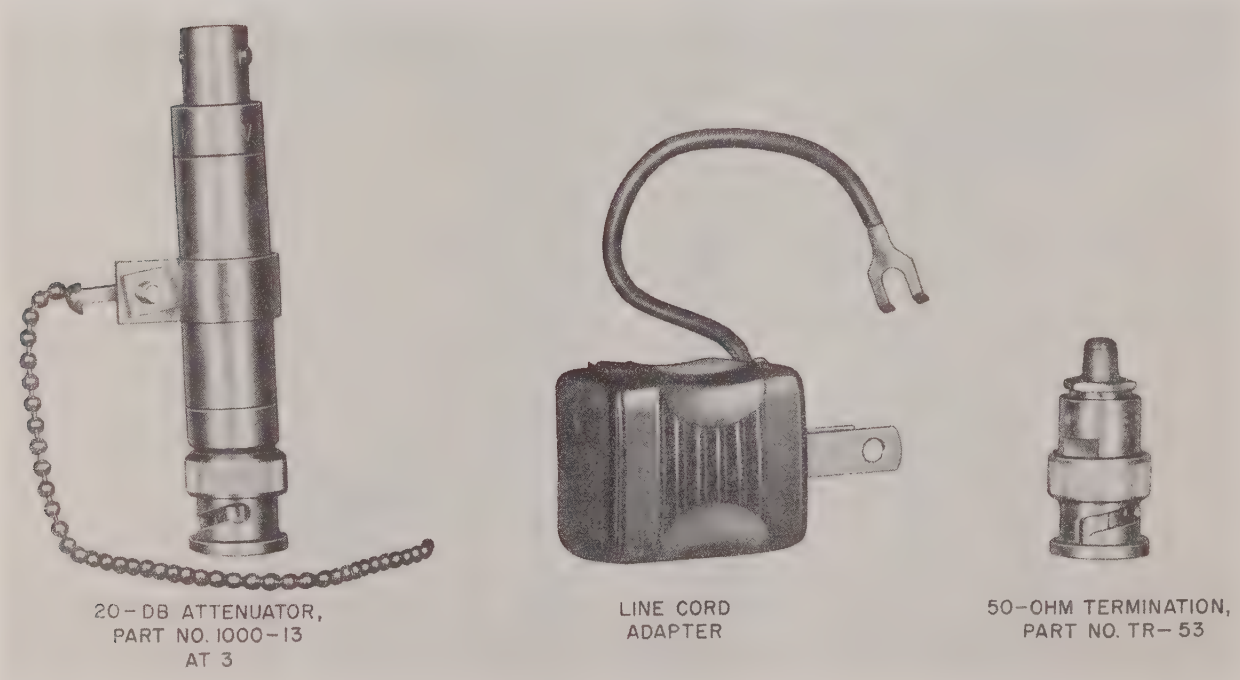


Figure 3-2. Sweep Generator Accessories

SECTION IV

OPERATION INSTRUCTIONS

4-1. GENERAL.

4-2. This section describes the controls and procedures necessary to operate the sweep generator. Prior to any operating procedure, perform the preliminary operations listed in paragraphs 4-5 through 4-19. These procedures are essential for becoming familiar with the equipment and obtaining optimum results.

4-3. OPERATING CONTROLS.

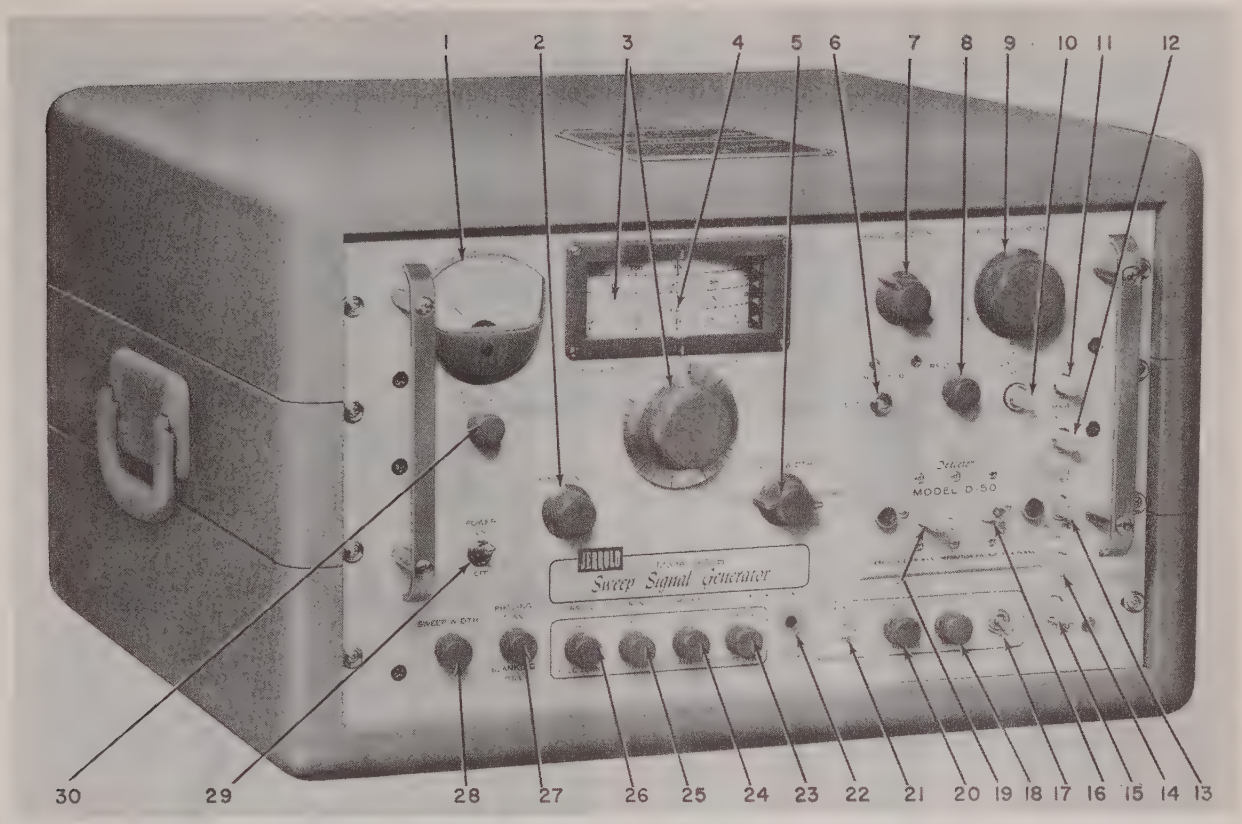
4-4. Refer to figures 4-1, 4-2, and 4-3 for the function and location of the main operating controls of the sweep generator.

Figure and Index No.	Control	Function
4-2, 2	FINE TUNING R14	Provides small increment adjustment for tuning dial.
4-2, 3	FREQUENCY MEGACYCLES scale	Indicates center frequency of range of frequencies being swept.
4-2, 3	FREQUENCY MEGACYCLES KNOB	Rotates FREQUENCY MEGACYCLES scale to position desired. Divides 10 MC steps on FREQUENCY MEGACYCLES scale into 2-mc increments.
4-2, 5	SWEEP WIDTH, WIDE-NARROW S3	WIDE position permits 500 kc to 400 mc maximum sweep of center frequency. NARROW position permits 10 kc to 1 mc maximum sweep of center frequency.
4-2, 6	DETECTOR, EXT-INT switch S14	INT position connects D-50 detector into PREAMPLIFIER input circuit. EXT position connects EXT DET INPUT jack to PREAMPLIFIER input.
4-2, 7	BAND SELECTOR, VHF-UHF S5	VHF position selects VHF range of center frequencies. UHF position selects UHF range of center frequencies.
4-2, 8	RF OUTPUT R10	Varies sweep generator output at RF OUTPUT connector.
4-2, 9	ATTENUATOR db AT1	Attenuates sweep generator output in 10 db steps from 0 to 50 db.
4-2, 17	AC-DC switch S12	Provides a-c or d-c output voltage to external oscilloscope input.
4-2, 18	DC LEVEL R37	Sets d-c reference level on external oscilloscope for zero DC at zero r-f level.
4-2, 20	GAIN R506	Adjusts voltage output of preamplifier.

Figure 4-1. Function of Sweep Generator Controls (Sheet 1 of 2)

Figure and Index No.	Control	Function
4-2, 21	BALANCE R527	Adjusts trace on external oscilloscope screen for proper d-c balance.
4-2, 22	FIXED OSC FREQ C205	Provides fine adjustment for VHF oscillator frequency.
4-2, 23	MASTER GAIN R24 PULL EXT MARKER S9	IN position adjusts amplitude level for all energized internal markers (1, 10 and 100 MC). OUT position connects MKR INPUT jacks into marker mixer unit and adjusts levels of external markers plus all energized internal markers.
4-2, 24	100 MC MARKER GAIN R23, S8	IN position deenergizes 100 MC marker signal. OUT position energizes 100 MC marker generator and adjusts level of 100 mc markers.
4-2, 25	10 MC MARKER GAIN R22, S7	IN position deenergizes 10 MC marker signal. OUT position energizes 10 MC marker generator and adjusts level of 10 mc markers.
4-2, 26	1 MC MARKER GAIN R21, S6	IN position deenergizes 1 MC marker signal. OUT position energizes 1 MC marker generator and adjusts level of 1 mc markers.
4-2, 27	PHASING TURN, BLANKING PULL R8, S10	IN position adjusts return trace on oscilloscope screen to coincide with forward trace. OUT position blanks out return trace.
4-2, 28	SWEEP WIDTH R9	Adjusts amplitude of wobbulator assembly to vary the sweep frequency limits from zero to maximum. Does not vary frequency of 60-cycle rate of sweep.
4-2, 29	POWER, ON-OFF S1	Applies a-c supply line voltage to sweep generator.
4-2, 30	PULL TURN FOR ZERO R28, S11	IN position is normal operating position. OUT position deenergizes oscillators and adjusts electrical zero of meter.
4-3, 6	PHASE REV. S4	UP position provides normal presentation of response curve on oscilloscope screen. DOWN position provides reverse presentation of response curve on oscilloscope screen.
4-3, 7	BLANK PHASE R29	Adjusts phase of blanking signal to coincide with start and stop of sweep cycles.
4-3, 11	REAR PANEL, FRONT PANEL S501	REAR PANEL position connects preamplifier output to EXT DET INPUT jack J506B for use with an external detector. FRONT PANEL position connects preamplifier input to DETECTOR EXT-INT switch S14.

Figure 4-1. Function of Sweep Generator Controls (Sheet 2 of 2)



1. VOLTS METER M301
2. FINE TUNING Control R14
3. FREQUENCY MEGACYCLES Scale and Knob
4. Dial Cursor
5. SWEEP WIDTH, WIDE-NARROW Switch S3
6. DETECTOR, EXT-INT Switch S14
7. BAND SELECTOR, VHF-UHF Switch S5
8. RF OUTPUT Control R10
9. ATTENUATOR db Control AT1
10. EXT DET INPUT Jack J506A
11. MKR INPUT Jack J2A
12. MKR INPUT Jack J3A
13. SCOPE VERT Output Jack J501A
14. SCOPE HORIZ Output Jack J1A
15. RF OUTPUT Jack J4
16. DETECTOR Input Jack J902
17. PREAMPLIFIER AC-DC Switch S12
18. PREAMPLIFIER DC LEVEL Control R37
19. DETECTOR Input Jack J901
20. PREAMPLIFIER GAIN Control R506
21. PREAMPLIFIER BALANCE Control R527
22. FIXED OSC FREQ Adjustment C205
23. MARKER MASTER GAIN Control R24
    PULL EXT MKR Switch S9
24. 100 MC MARKER GAIN Control and Switch R23, S8
25. 10 MC MARKER GAIN Control and Switch R22,S7
26. 1 MC MARKER GAIN Control and Switch R21, S6
27. PHASING Control and BLANKING Switch R8, S10
28. SWEEP WIDTH Control R9
29. POWER, ON-OFF Switch S1
30. PULL TURN FOR ZERO Meter Adjustment R28, S11

Figure 4-2. Front Panel Controls and Connections

4-5. OPERATION.

4-6. PRELIMINARY OPERATION. The sweep generator must be used in conjunction with an external oscilloscope to provide a visual presentation of the response curves of the equipment to be tested. A suitable oscilloscope, such as a Hewlett-Packard Model 130B, or equivalent, may be used. Perform the following preliminary operations to determine if the basic electrical circuits operate properly.

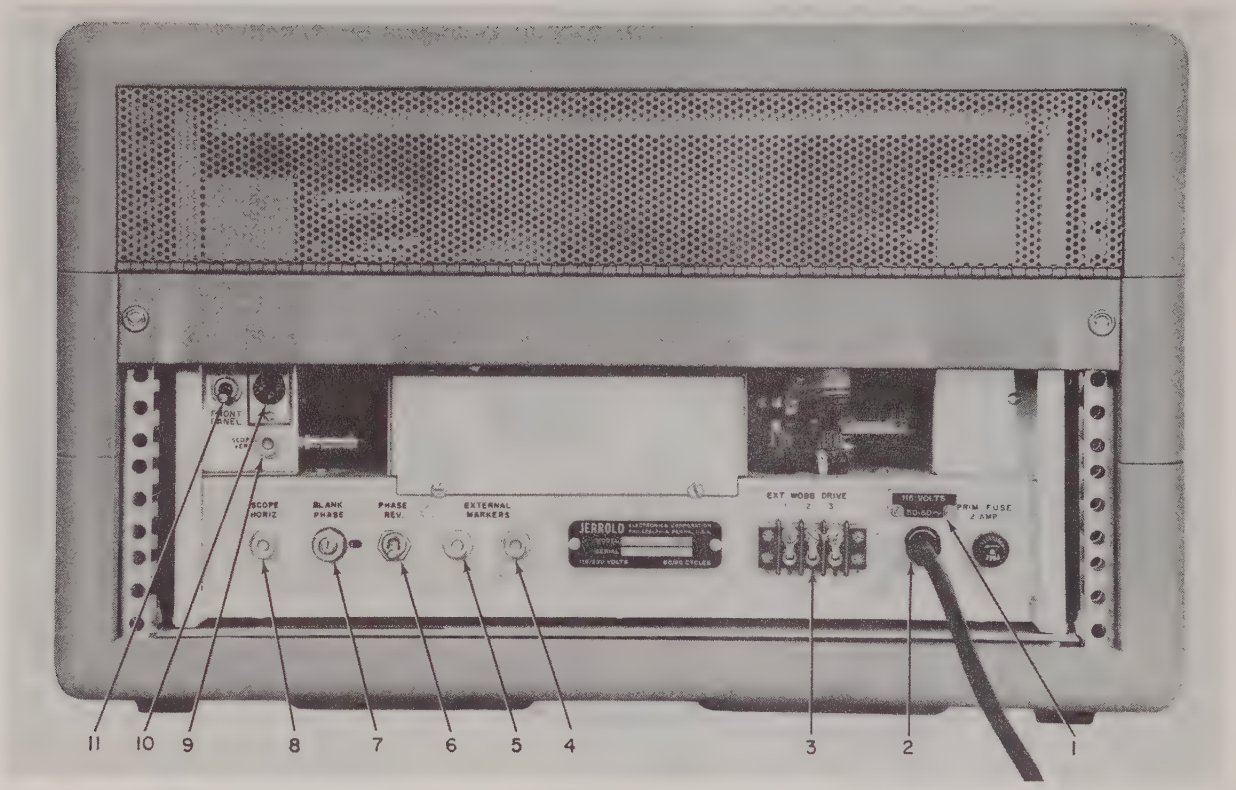
4-7. OSCILLOSCOPE CONNECTIONS. Place the oscilloscope at the side of the sweep generator and connect the two units as follows. (Refer to figure 4-4).

a. Connect the vertical amplifier input of the oscilloscope to the SCOPE VERT jack J501A on the front panel of the sweep generator.

b. Connect the horizontal amplifier input of the oscelloscope to the SCOPE HORIZ jack J1A on the front panel of the sweep generator.

NOTE

The SCOPE VERT J501B and the SCOPE HORIZ J1B jacks on the rear panel may also be used, if convenient. The two sets of jacks on the front and rear panels are connected in parallel and may be used interchangeably.



1. Line Voltage Instruction Plate
2. Power Cord
3. EXT WOBB DRIVE Terminal Board TB1
4. EXTERNAL MARKERS Input Jack J2B
5. EXTERNAL MARKERS Input Jack J3B
6. PHASE REV. Switch S4
7. BLANK. PHASE Adjustment R29
8. SCOPE HORIZ. Output Jack J1B
9. SCOPE VERT. Output Jack J501B
10. External Detector Input Jack J506B
11. REAR PANEL-FRONT PANEL Switch for External Detector Jacks S501

Figure 4-3. Rear Panel Controls and Connections

c. Set the oscilloscope vertical amplifier sensitivity to accept a signal of 0.1 to 0.2 volts per centimeter.

d. Set the oscilloscope horizontal amplifier to external sweep input.

4-8. UHF CIRCUITS. Check the UHF circuits of the sweep generator for proper operation as directed below.

a. Refer to the instruction plate (1, figure 4-3) to determine the supply voltage required. Plug the power cord into a receptacle whose voltage and frequency correspond to that printed on the instruction plate.

NOTE

The sweep generator is designed to operate from a supply voltage of 115 or 230 volts ac, plus or minus 25 percent, and a supply frequency of 50 or 60 cycles. If the supply voltage or frequency available is not the same as called for on the above instruction plate, remove the sweep generator from its cabinet. Set the supply voltage switch S13, figure 7-3, to 115 or 230 volts, as required. Insert frequency changing plug P16 into jack J13 for 50 cycles, or jack J14 for 60 cycles, as required. Remove the instruction plate (1, figure 4-3) and reverse it so that the correct supply voltage is indicated.

b. Turn POWER switch S1 to the ON position.

c. Turn the oscilloscope on.

d. Allow at least one-half hour for both instruments to warm up.

e. Set PREAMPLIFIER AC-DC switch S12 to DC position.

f. Set PREAMPLIFIER GAIN control R506 to maximum counterclockwise position.

g. Connect RF OUTPUT jack J4 to one DETECTOR jack J902, on the front panel of the sweep generator, using a test cable made up of an 8-inch length of RG-55/U cable with a UG-88/U connector on each end. Terminate the other DETECTOR jack, J901, with the TR-53 termination shipped with the sweep generator.

h. Set BAND SELECTOR switch S5 to UHF position.

i. Set SWEEP WIDTH switch S3 to WIDE position.

j. Set RF OUTPUT control R10 to full clockwise position.

k. Set ATTENUATOR db control AT1 to 20 position.

l. Set SWEEP WIDTH control R9 to full clockwise position.

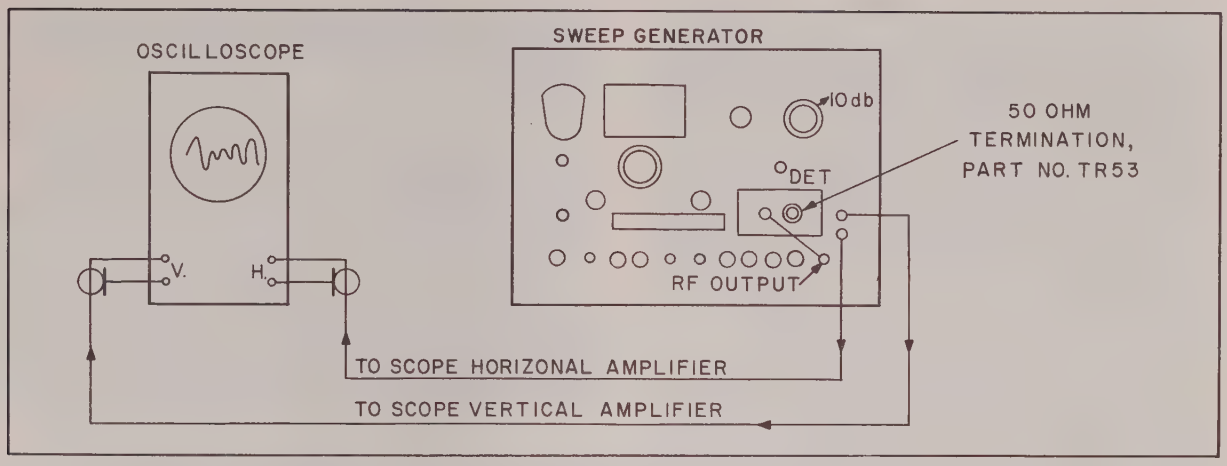


Figure 4-4. Test Setup of Sweep Generator and Oscilloscope for Preliminary Operation

NOTE

If the wobbulator assembly chatters, turn the SWEEP WIDTH knob counterclockwise until the chattering stops. This chattering does not indicate any malfunction of the unit. No damage will occur from the chattering noise unless it is prolonged.

m. A pattern should now appear on the oscilloscope screen. If a pattern does not appear, adjust PREAMPLIFIER BALANCE control R527 and/or DC LEVEL control R37 until a pattern appears.

n. Balance the preamplifier for dc by rotating PREAMPLIFIER GAIN control R506 back and forth. Adjust PREAMPLIFIER BALANCE control R527 to keep the pattern on the oscilloscope screen until the PREAMPLIFIER GAIN control R506 can be rotated throughout its entire range while the pattern on the oscilloscope screen remains stationary.

o. Adjust PREAMPLIFIER DC LEVEL control R37 to set the position of the base line on the oscilloscope for best presentation.

p. Pull BLANKING PULL switch S10 to OUT position.

q. Set MARKER MASTER GAIN control R24 to IN position and rotate it full clockwise.

r. Pull 100 MC switch S8 to OUT position, and rotate the 100 MC MARKER GAIN control R23 clockwise until markers appear on the oscilloscope screen. From two to four markers should be observed, depending upon the setting of the FREQUENCY MEGACYCLES dial.

s. Push BLANKING PULL switch S10 to IN position. Observe the return trace and a double set of markers.

t. Rotate PHASING TURN control R8 until top and bottom markers coincide on the oscilloscope screen.

u. Pull BLANKING PULL switch S10 to OUT position. The return set of markers will be blanked out.

v. Rotate RF OUTPUT control R10 slowly counterclockwise to flatten the response curve. Rotate further counterclockwise. The RF output indication on the oscilloscope screen will decrease. Observe that VOLTS meter M301 indicates less RF output.

w. Observe various SWEEP WIDTH control R19 settings.

NOTE

Whenever SWEEP WIDTH control R9 or SWEEP WIDTH switch S3 setting is changed, readjust the phasing. Repeat steps s, t, and u each time.

x. When sweep width becomes narrower, the 100 MC markers will disappear from the oscilloscope screen display. Pull 1 MC and 10 MC MARKER switches S6 and S7 to OUT position. Rotate 1 MC and 10 MC controls R21 and R22, and observe the markers on the oscilloscope screen.

y. Set SWEEP WIDTH switch S3 to NARROW position.

z. Observe various SWEEP WIDTH control R9 settings and readjust the phasing as described in the note following step w.

4-9. VHF CIRCUITS. Check the VHF circuits of the sweep generator for proper operation as directed below.

a. Set BAND SELECTOR switch S5 to VHF position.

b. Set SWEEP WIDTH switch S3 to WIDE position.

c. Set the ATTENUATOR db control AT1 to 0 position.

d. Set the FREQUENCY MEGACYCLES dial to 200 on the scale indicated by the illuminated red arrows.

e. Observe the pattern on the oscilloscope screen. A marker corresponding to the zero beat between the 600 mc fixed oscillator and the 200 mc center frequency of the sweep oscillator will appear near the left-hand edge of the oscilloscope screen. If the marker appears elsewhere on the screen, adjust the FREQUENCY MEGACYCLES dial until the marker moves to the proper position.

f. Repeat the series of checks described in paragraph 4-8, steps p through z, making adjustments and observations as required.

4-10. PROPER INTERPRETATION OF MARKERS.

4-11. Before using the sweep generator for actual equipment testing, the operator must understand the frequency marker system (birdy marker) and the interpretation of the various markers observed on the oscilloscope screen.

4-12. INTERNAL MARKERS. The internal marker circuits in the sweep generator provide frequency markers at 100, 10, and 1 mc and all their multiples within the frequency range of the sweep generator. These markers are generated from a 5-mc crystal-controlled oscillator and are extremely accurate. Separate amplitude controls R21, R22, and R23 are provided for each of the three sets of marker multiples to allow rapid identification of the frequency represented by an individual marker. Perform the following operations and observe the actions of the markers. (Refer to figure 4-5.)

a. Set up the sweep generator and oscilloscope as described in paragraph 4-8, steps a through p.

b. Set SWEEP WIDTH switch S3 to WIDE position.

c. Set up a basic response curve at 750 mc. Observe the presentation on the oscilloscope screen. It should resemble response (A) in figure 4-5.

d. Increase the sweep width by rotating SWEEP WIDTH control R9 until a narrow response curve presentation is observed similar to response (B). Adjust PHASING control R8 as described in paragraph 4-8, steps s, t, and u.

e. Pull 100 MC MARKER control R23, S8 to OUT position and rotate it clockwise until markers are visible and resemble response (B).

f. Observe that the peak of the response curve is between two markers which can be identified as 700 and 800 mc. (Since the markers are on integral 100 mc points, and the center frequency of the response curve was chosen as 750 mc, the identification of the two markers bridging the response curve is 700 and 800 mc.)

g. Pull 10 MC MARKER control R22, S7 to the OUT position and rotate it clockwise until the markers are visible and resemble response (C). These 10-mc markers should be set slightly smaller in amplitude than the 100-mc markers to enable them to be easily identified.

h. Observe that the peak of the response curve is between two markers representing 740 and 750 mc, respectively. Start with the large 100 mc marker representing 700 mc at the left-hand edge of the screen, and count each 10-mc marker until the markers representing 740 and 750 mc are reached.

i. Decrease the sweep width by rotating SWEEP WIDTH control R9 counterclockwise until the 740 and 750 mc markers are near the left-hand and right-hand edges of the oscilloscope screen, respectively. Adjust PHASING TURN control R8 as described in paragraph 4-8, steps s, t, and u.

j. Pull 1 MC MARKER control R21, S6 to OUT position and rotate it clockwise until the markers are visible and resemble response (D). Set these 1-mc markers slightly smaller in amplitude than the 10-mc markers to enable them to be easily identified.

k. Observe that the peak of the response curve falls between the seventh and eighth 1-mc markers, representing 747 and 748 mc. If necessary, adjust the horizontal amplifier and horizontal position controls on the oscilloscope to facilitate this observation.

l. If a finer frequency determination is required, decrease the sweep width farther (step i, above) until the 1-mc markers representing 747 and 748 mc are at the left-hand and right-hand edges of the oscilloscope screen, coinciding with the edges of the centimeter grid. Estimate 0.1-mc points on the response curve by observing the intersection of the grid lines with the response curve.

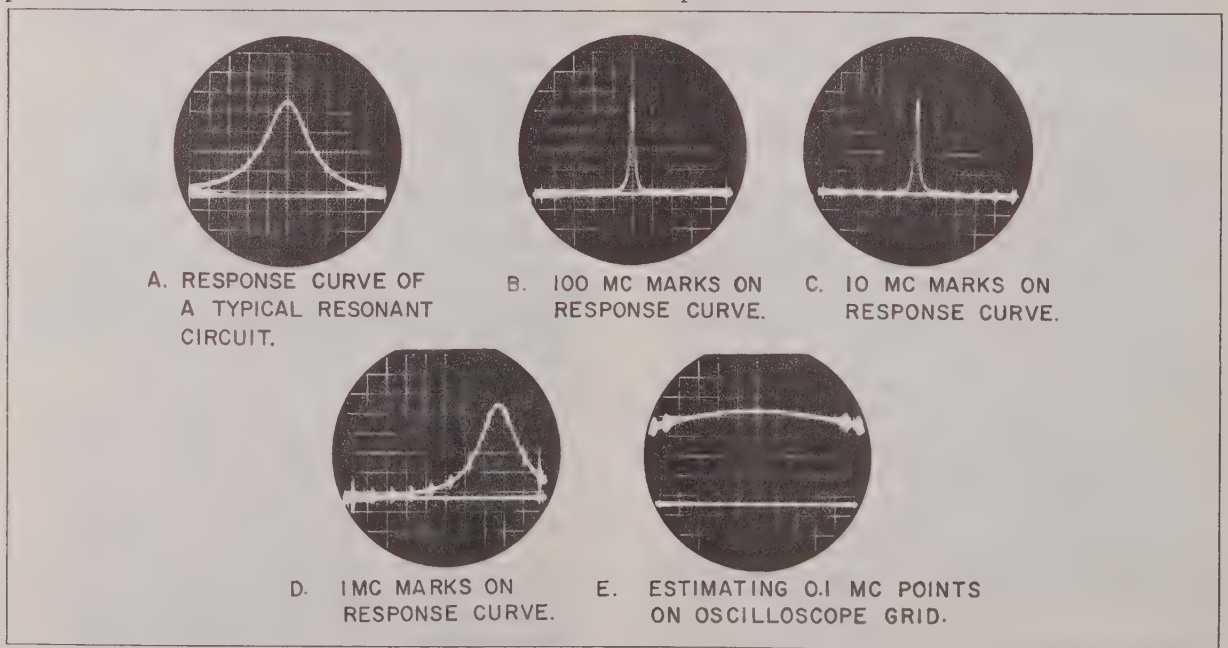

A. RESPONSE CURVE OF A TYPICAL RESONANT CIRCUIT.
B. 100 MC MARKS ON RESPONSE CURVE.
C. 10 MC MARKS ON RESPONSE CURVE.
D. 1MC MARKS ON RESPONSE CURVE.
E. ESTIMATING 0.1 MC POINTS ON OSCILLOSCOPE GRID.

Figure 4-5. Typical Oscilloscope Displays for Setting Controls, Using Internal Markers

4-13. EXTERNAL MARKERS. The sweep generator has provision for the use of markers derived from external equipment. For checking certain types of equipment, such as bandpass filters or television receivers, specific fixed marker frequencies are required for band-edge determination.

4-14. Four jacks are provided for the connection of external marker sources. Two of the jacks, J2A and J3A (figure 4-2), are located on the front panel and terminate in a connector, P803 (figure 4-6), on the top of the marker mixer. Two similar jacks, J2B and J3B (figure 4-3), are located on the rear apron of the power supply chassis, and terminate in a connector, P803B (figure 4-6), attached by a clip behind the panel. When use of the rear apron jacks J2B and J3B is required, remove connector P803A from jack J803 and substitute connector P803B.

4-15. When frequency markers from an external source are required on the oscilloscope presentation, use the following procedure to make the proper connections:

a. Connect the output of the external marker source to one of the MKR INPUT jacks, J2A and J3A. A signal of more than 20 millivolts is required.

b. Pull MARKER MASTER GAIN control S9 to OUT position. This connects the external marker source to the marker amplifier.

c. Adjust MARKER MASTER GAIN control R21 until the markers are visible on the oscilloscope pattern.

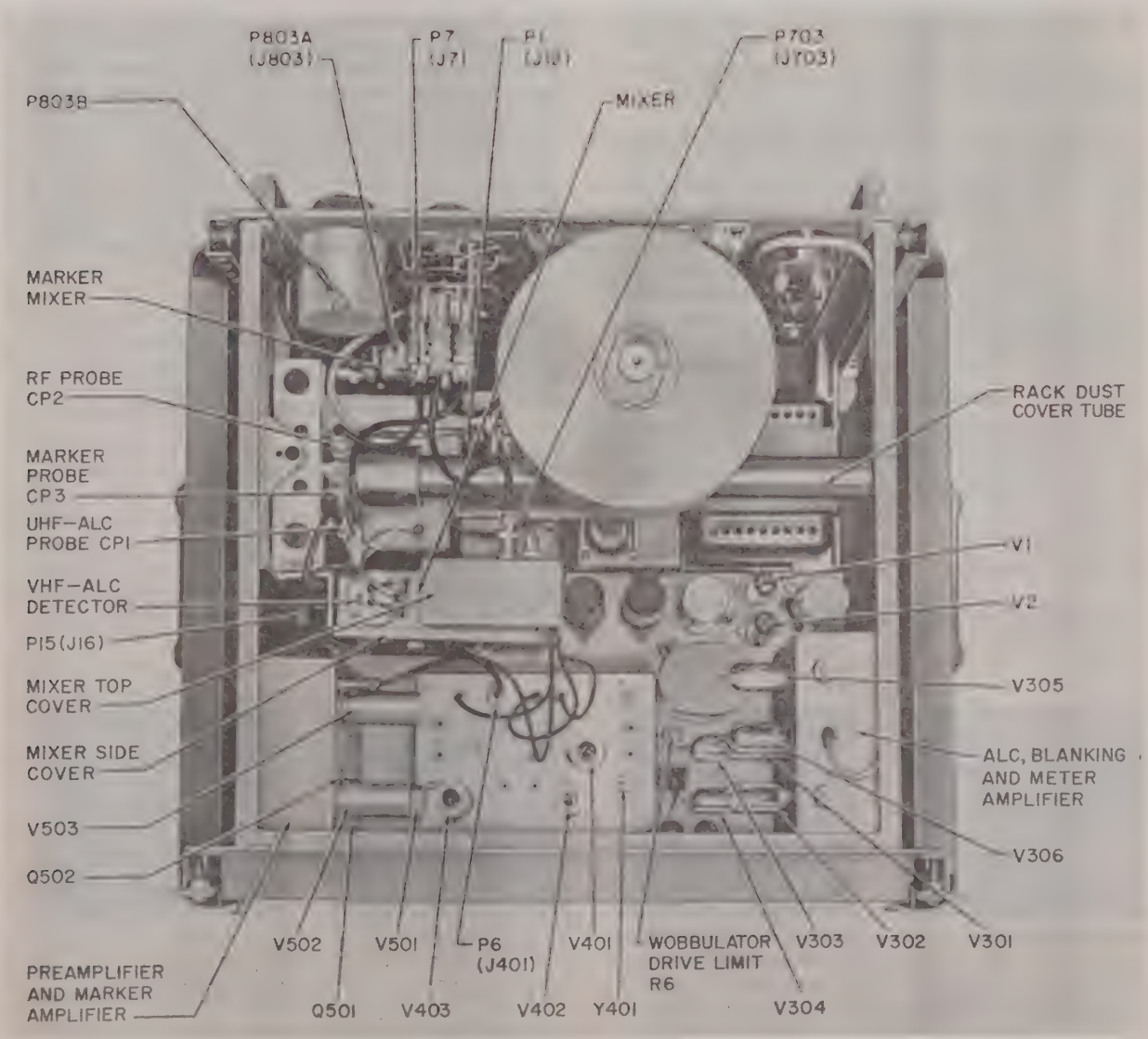


Figure 4-6. Top View of Sweep Generator

4-16. ADJUSTING FOR CLEAREST EXTERNAL FUNDAMENTAL MARKERS. When a marker is derived from the fundamental frequency of the external marker source, and the response resembles (A), figure 4-7, use the following procedure to obtain the clearest presentation of the markers.

a. Set the output control of the external marker source to the lowest setting that will give a suitable signal.

b. Set MARKER MASTER GAIN control R24 on the sweep generator to as high a setting as required to provide useable markers on the oscilloscope screen. The response should now resemble (B), figure 4-7.

4-17. ADJUSTING FOR CLEAREST EXTERNAL HARMONIC MARKERS. When a marker is derived from a harmonic frequency of the external marker source, use the following procedure to present the sharpest markers:

a. Set MASTER MARKER GAIN control R24 at a relatively low setting.

b. Set the output control of the external marker source as high as practical without making the amplitude of the markers more than 15 percent of the total height of the response curve. (Refer to figure 4-5 for typical examples.)

4-18. SIDEBAND MARKERS. Where a band-pass response curve is to be observed, it is often convenient to provide frequency markers at the upper center, and lower frequency limits of the desired band of frequencies. This can be accomplished in the sweep generator as follows:

a. Use two external marker sources, one having a frequency at the center of the band to be observed, and the other having a frequency equal to one-half the bandwidth of the frequency band to be observed.

b. Connect the output of one of these external marker sources to MKR INPUT jack J2A.

c. Connect the output of the other of these external marker sources to MKR INPUT jack J3A.

d. Pull MARKER MASTER GAIN control R24, S9 to OUT position and ajust it, in conjunction with the output controls of the external center frequency marker source, until the oscilloscope display resembles (C), figure 4-7.

e. Adjust the output controls of the external one-half bandwidth marker source until the oscilloscope display resembles (D), Figure 4-7.

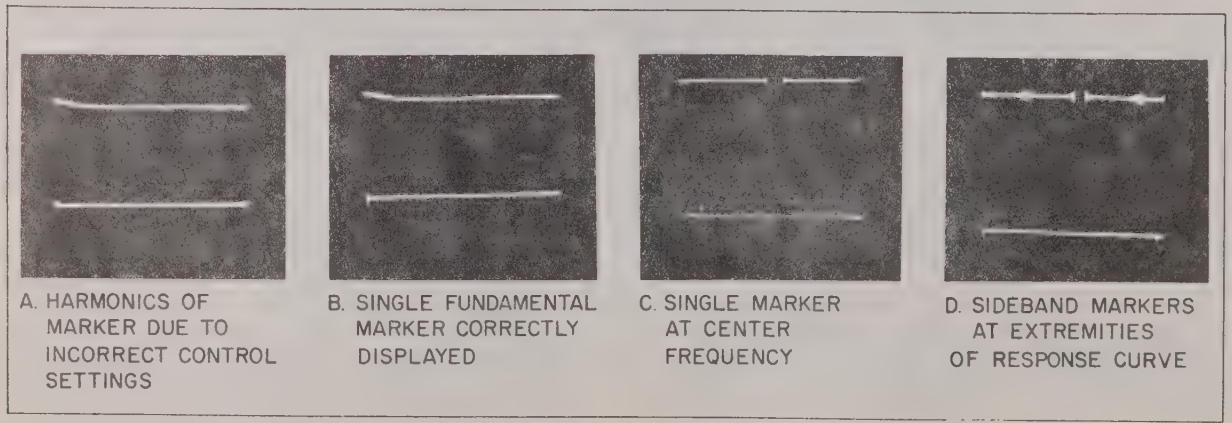
4-19. EXTRANEOUS MARKERS. When the sweep generator is used in the VHF position and the MASTER MARKER GAIN control is pulled to the OUT position, markers will be observed on the trace even though no external marker source is connected to the sweep generator. These extraneous markers are particularly evident at 100 mc, 200 mc, and 300 mc, with weaker ones appearing at other frequencies. These extraneous markers are due to the extremely wide VHF sweep widths made available in the sweep generator. Markers can be obtained only by mixing the output of a fixed frequency oscillator with the output of a wide-range variable frequency oscillator. Spurious products at frequencies other than the desired difference frequency are unavoidable in such oscillator combinations. Although every effort has been made to design the mixer for minimum spurious output, heterodyning action generates extraneous frequencies. These appear as extraneous markers and are most noticeable at high setting of the RF OUTPUT control R10.

NOTE

For minimum extraneous marker generation, and the clearest marker presentation, use the lowest setting of RF OUTPUT control R10 which permits satisfactory presentation.

4-20. SWEEP GENERATOR OPERATING APPLICATIONS.

4-21. The Model 1974 Sweep Signal Generator is a general purpose test set designed for many different applications where band-pass response or characteristic is required. The paragraphs that follow describe a few of the most common types of tests that can be made with the sweep generator and oscilloscope.



A. HARMONICS OF MARKER DUE TO INCORRECT CONTROL SETTINGS

B. SINGLE FUNDAMENTAL MARKER CORRECTLY DISPLAYED

C. SINGLE MARKER AT CENTER FREQUENCY

D. SIDEBAND MARKERS AT EXTREMITIES OF RESPONSE CURVE

Figure 4-7. Typical Oscilloscope Displays for Setting Controls, Using External Markers

4-22. TESTING A COMPLETE RECEIVER. The overall band width of a complete receiver can be measured with the sweep generator by utilizing the following procedure. (Refer to figure 4-8.)

a. Connect RF OUTPUT jack J4 of the sweep generator to the input terminals of the receiver through a matching pad, balun, or dummy antenna, as required.

b. By inspection of the receiver circuitry, determine a suitable point in its second detector circuit to obtain rectified output voltage. If this voltage is 0.1 volt peak-to-peak or more, connect it directly to the vertical amplifier input terminals of the oscilloscope, observing correct ground polarity. Connect a 50 micromicrofarad (uuf) capacitor, from SCOPE VERT jack J501A of the sweep generator to the ungrounded vertical amplifier input terminal of the oscilloscope, to couple the frequency marker signals to the oscilloscope.

c. If the receiver output voltage obtained in step b is less than 0.1 volt peak-to-peak, connect it to EXT DET INPUT jack J506A on the sweep generator. This action connects the preamplifier (figure 4-6) into the circuit to boost the receiver output signal and produce a readable oscilloscope pattern.

d. If the receiver has an automatic gain control (AGC) system, disable it and substitute a manually-varied bias control. The exact procedure will depend upon the particular type of receiver being tested.

e. Turn on the receiver and allow it to warm up for a sufficient length of time to become stable.

f. Set the FREQUENCY MEGACYCLES dial on the sweep generator to the same center frequency as that of the receiver.

g. Adjust the preamplifier controls as described in paragraph 4-8, steps m, n, and o, to obtain a satisfactory pattern on the oscilloscope screen.

h. Set SWEEP WIDTH switch S3 and SWEEP WIDTH control R9 just wide enough to show the entire response curve of the receiver. Observe the phasing precautions described in paragraph 4-8, steps s, t, and u.

i. Check the oscilloscope pattern for distortion by increasing ATTENUATOR db control AT1 on the sweep generator by 10 decibels. Move the ATTENUATOR db control to a setting 10 db higher than the one in use. If the shape (not amplitude) of the pattern changes significantly, overload distortion is indicated.

j. If distortion is present (step i above), reduce the input to the receiver and increase the setting of either PREAMPLIFIER GAIN control R506 on the sweep generator, or the vertical amplifier gain control on the oscilloscope, or both, until the test in step i indicates no distortion on the pattern. If necessary, insert external 20 db attenuator AT3 between RF output jack J4 and the test cable to the receiver input (figure 4-8).

k. Observe the pattern on the oscilloscope screen, making adjustments and band-width measurements as described in paragraph 4-12.

4-23. Where sudden changes are present in the response curve of the receiver circuit, such as highly selective traps to remove specific frequencies, the sweep may move past these traps too rapidly for the detector to follow accurately. To get a more accurate display, decrease SWEEP WIDTH control R9 and shift the FREQUENCY MEGACYCLES dial to cover only this small section of the response curve.

4-24. When the receiver circuit contains rejection notches or other very sharp changes in the response curve, spurious components may be generated in the amplifiers of the sweep generator or the oscilloscope. These will show up as extraneous markers on the response curve and can be distinguished from normal markers by reducing the setting of RF output control R10. Normal marker signals will be reduced proportionally; extraneous markers will tend to disappear completely. Whenever possible, use reduced RF OUTPUT control R10 settings of the sweep generator when the response curve contains sharp components.

4-25. When specific band-edge and band-center markers are required from an external source, refer to paragraphs 4-13 through 4-18 for the correct procedure for utilizing external markers.

4-26. TESTING THE RADIO FREQUENCY (RF) SECTION OF A RECEIVER. The response curve of only the radio frequency portion of a receiver may be analyzed by using the following procedure. (Refer to figure 4-9.)

a. Connect the sweep generator to the receiver as described in paragraph 4-22, step a, and figure 4-8.

b. Connect a suitably shielded output cable from EXT DET INPUT jack J506A to the d-c load resistor of the receiver mixer. This connection may be a test point on the receiver.

c. Use the same procedure as described in paragraph 4-22, steps d through j, to obtain the best display on the oscilloscope screen.

d. Keep the setting of RF OUTPUT control R10 as high as possible without causing distortion, but keep at least 10 db of attenuation on the ATTENUATOR db control AT1 to provide a proper impedance match to the input of the receiver.

e. Observe the pattern on the oscilloscope screen, making adjustments and measurements as described in paragraph 4-12.

f. If the response curve has sharp changes, refer to paragraphs 4-23 through 4-25 above.

4-27. ELIMINATION OF HUM. If the forward and return traces cannot be brought to coincidence when phasing is attempted, the trouble is probably due to the existence of hum voltage at EXT DET INPUT jack J506A. Determine if the hum voltage originates in the local oscillator stage of the receiver by temprarily disabling the oscillator. If the hum stops, restore the operation of the local oscillator and use the following procedure to reduce or eliminate this hum voltage:

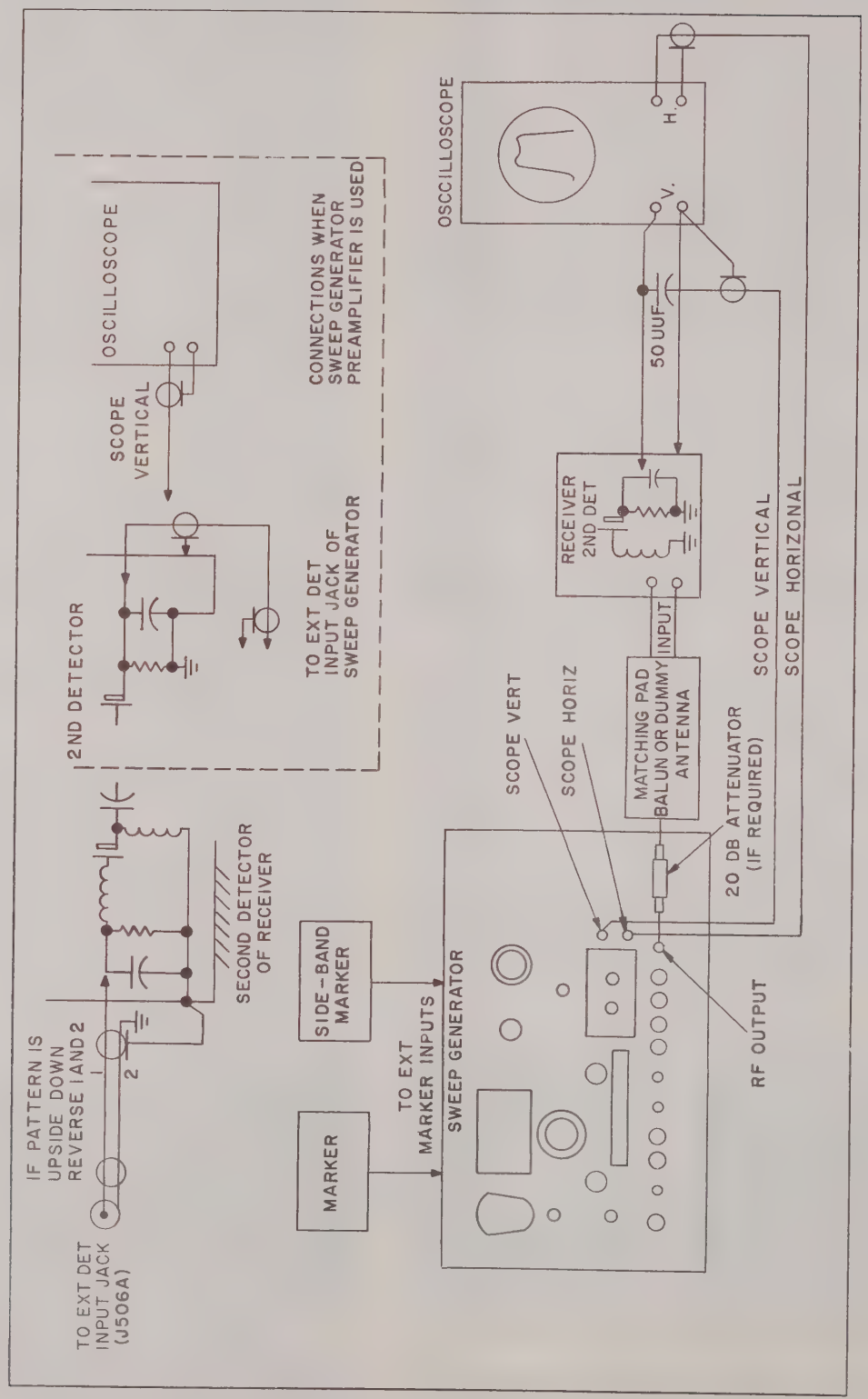


Figure 4-8. Testing a Complete Receiver

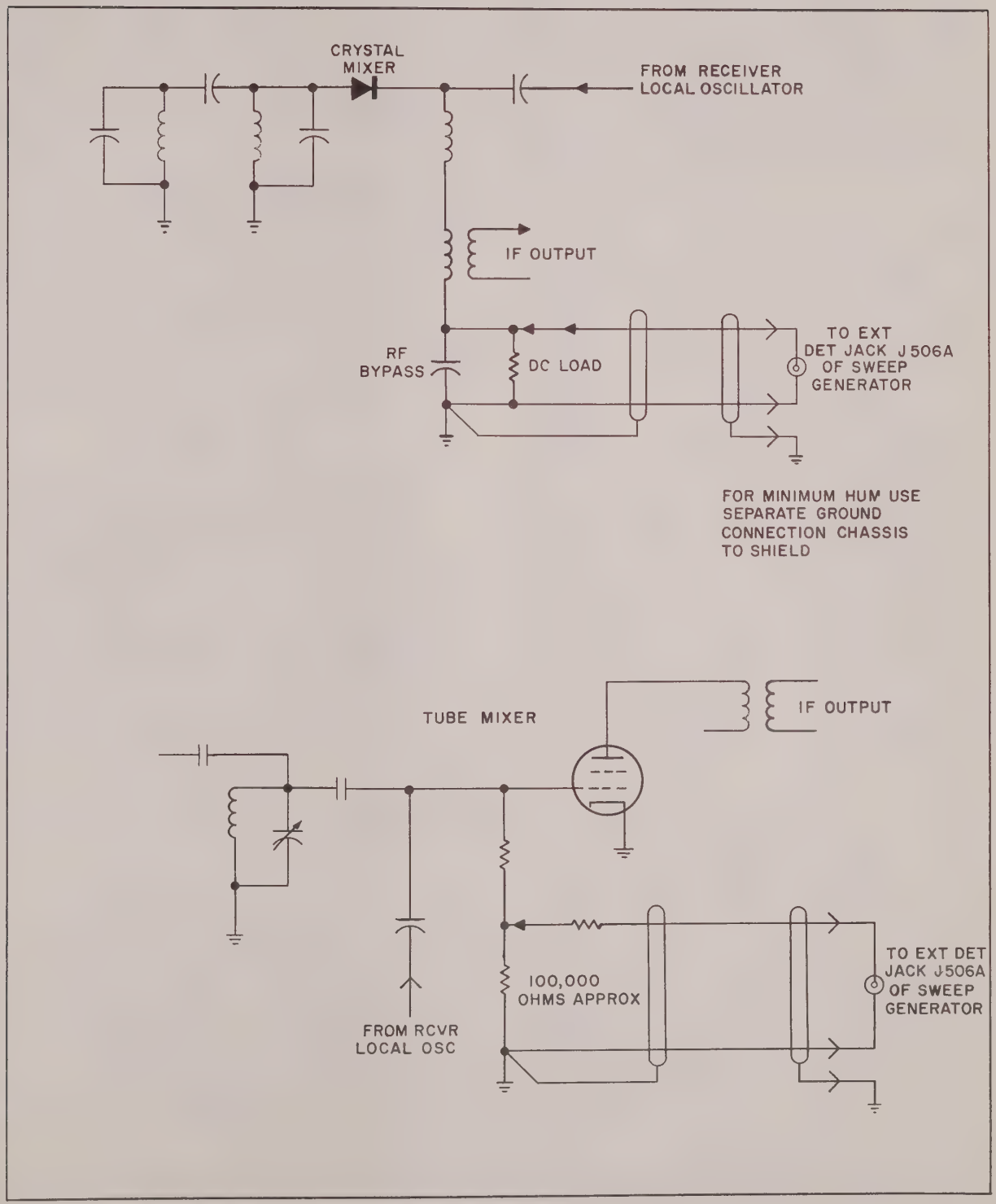

CRYSTAL MIXER
FROM RECEIVER LOCAL OSCILLATOR
IF OUTPUT
RF BYPASS
DC LOAD
TO EXT DET JACK J506A OF SWEEP GENERATOR
FOR MINIMUM HUM USE SEPARATE GROUND CONNECTION CHASSIS TO SHIELD
TUBE MIXER
IF OUTPUT
100,000 OHMS APPROX
TO EXT DET JACK J506A OF SWEEP GENERATOR
FROM RCVR LOCAL OSC

Figure 4-9. Testing the RF Section of a Receiver

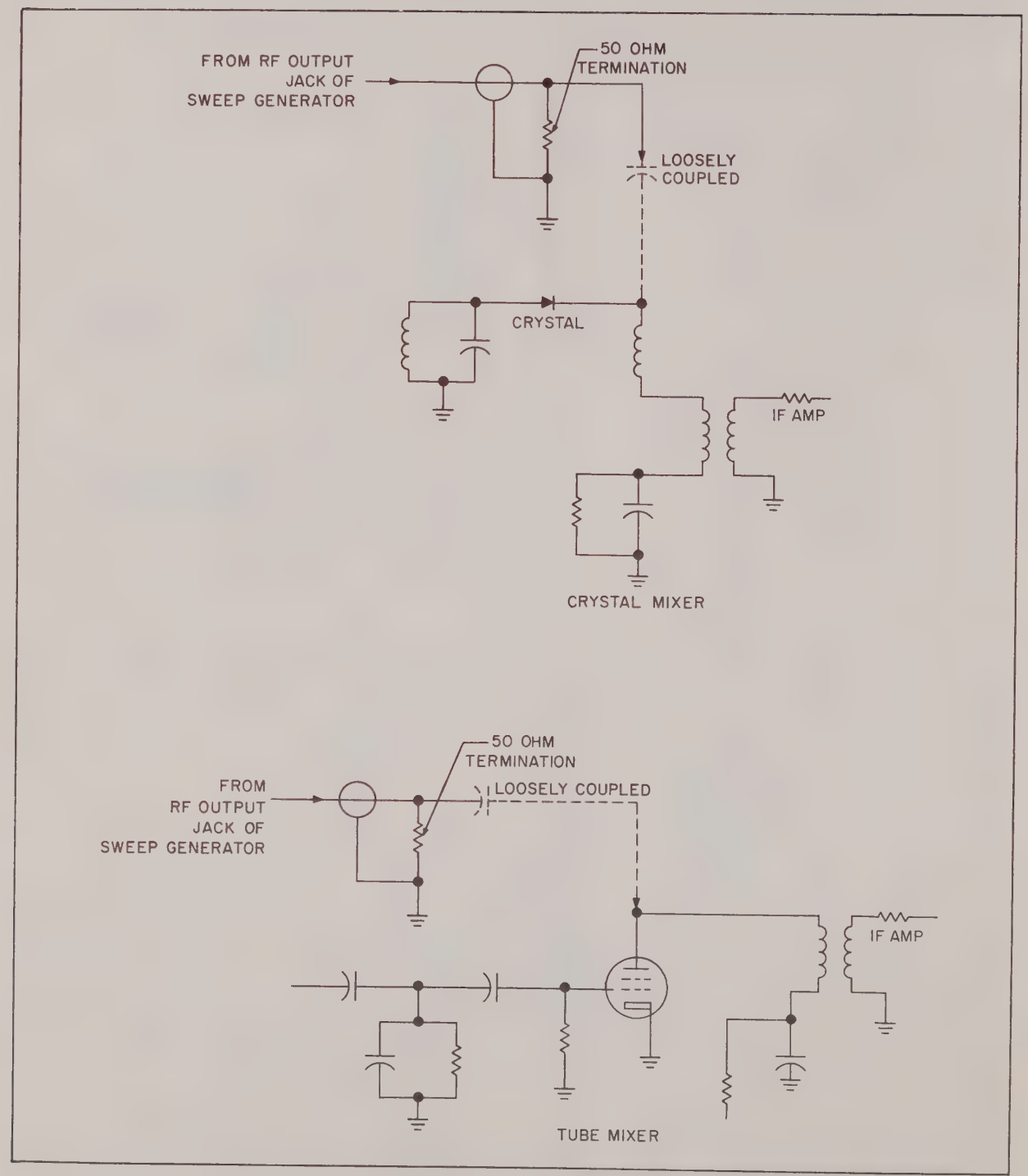


Figure 4-10. Testing the IF Section of a Receiver

a. Make up a special test cable consisting of two separately shielded leads, or two leads in an individual shield.

b. Connect one lead to the center pin of a UG-88/U connector.

c. Connect the other lead to the shell of the UG-88/U connector. Do not connect the shield to any portion of the connector.

d. Substitute this special cable for the output cable described in paragraph 4-26, step b.

e. Try grounding the shielding of the test cable to various points on the receiver chassis until a point of minimum hum pickup is found.

f. Ground the other end of the shielding to various points on the sweep generator chassis to see if further reduction of the hum voltage can be effected.

g. Use the combination of ground connections which results in the least amount of hum voltage.

NOTE

Use all means available to reduce the hum rather than make the test with the receiver local oscillator disabled, since the local oscillator excitation affects the input impedance of the receiver mixer input stage and alters the shape of the response curve.

4-28. TESTING THE INTERMEDIATE FREQUENCY (IF) SECTION OF A RECEIVER. The response curve of only the intermediate frequency portion of a receiver may be analyzed by using the following procedure. (Refer to figure 4-10.)

a. Connect the sweep generator to the receiver as described in paragraph 4-22, steps b through h, and figure 4-8.

b. Connect RF OUTPUT jack J4 to the output of the receiver mixer tube by a method which will give reasonably uniform response without changing the output impedance of the mixer state. A recommended method is shown in figure 4-10, where RF OUTPUT jack J4 of the sweep generator is connected to a 50-ohm terminating resistor at the output of the receiver mixer stage.

c. Couple the RF OUTPUT voltage of the sweep generator very loosely to the receiver mixer output to avoid changing the tuning of the mixer plate circuit.

NOTE

It is important to introduce the signal from the sweep generator to the receiver mixer stage by a method that does not result in added overall feedback in the receiver IF circuits. Ground the outer shield of the test cable from the sweep generator carefully to the chassis of the receiver near the mixer stage. If the frequency is above 10 mc, it is preferable to attach the test cable to a connection which brings it through the chassis, thus using the chassis as a shield against unwanted feedback fields.

d. Use the same procedure as described in paragraph 4-22, steps d through j, to obtain the best display on the oscilloscope screen.

e. Observe the pattern on the oscilloscope screen, making adjustments and measurements as described in paragraph 4-12.

4-29. TESTING RADIO FREQUENCY AMPLIFIERS.

4-30. ANALYZING AMPLIFIER RESPONSE. The response curve of a radio frequency amplifier operating within the 500-kilocycle to 1200-megacycle range may be analyzed by using the following procedure. (Refer to figure 4-11.)

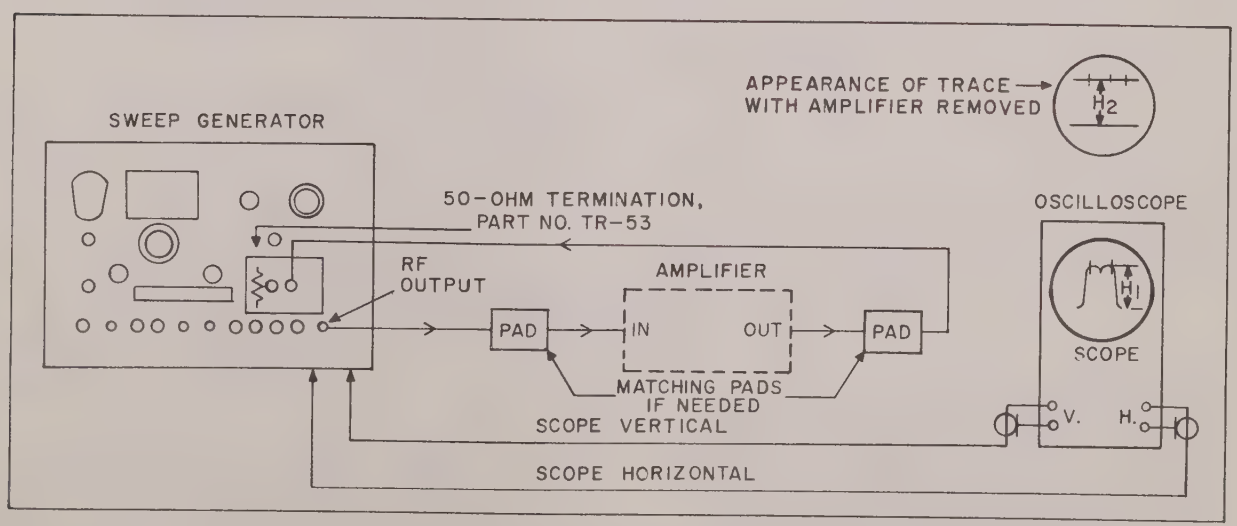
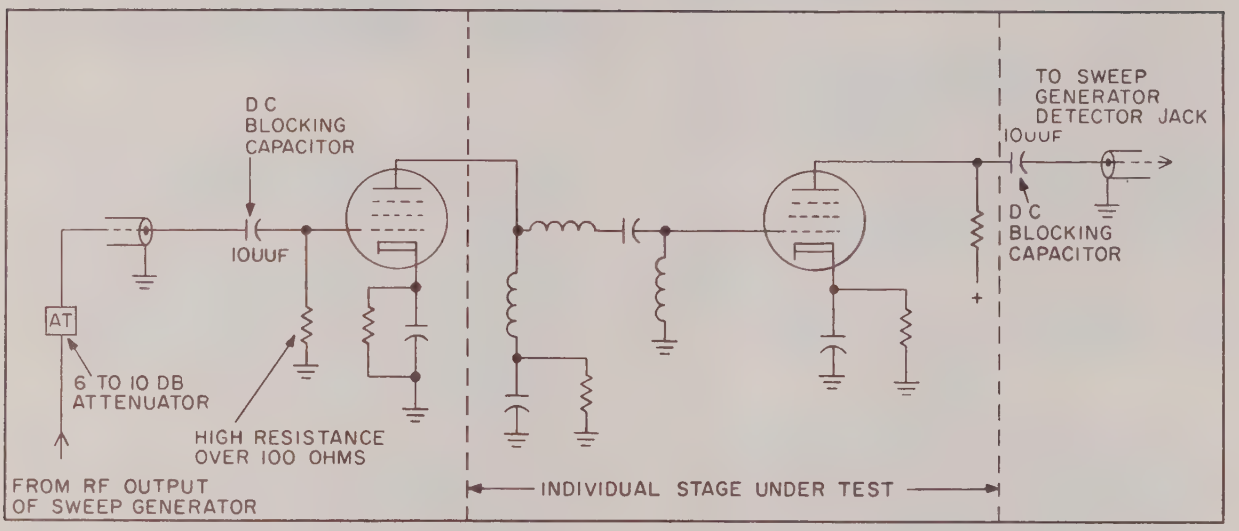
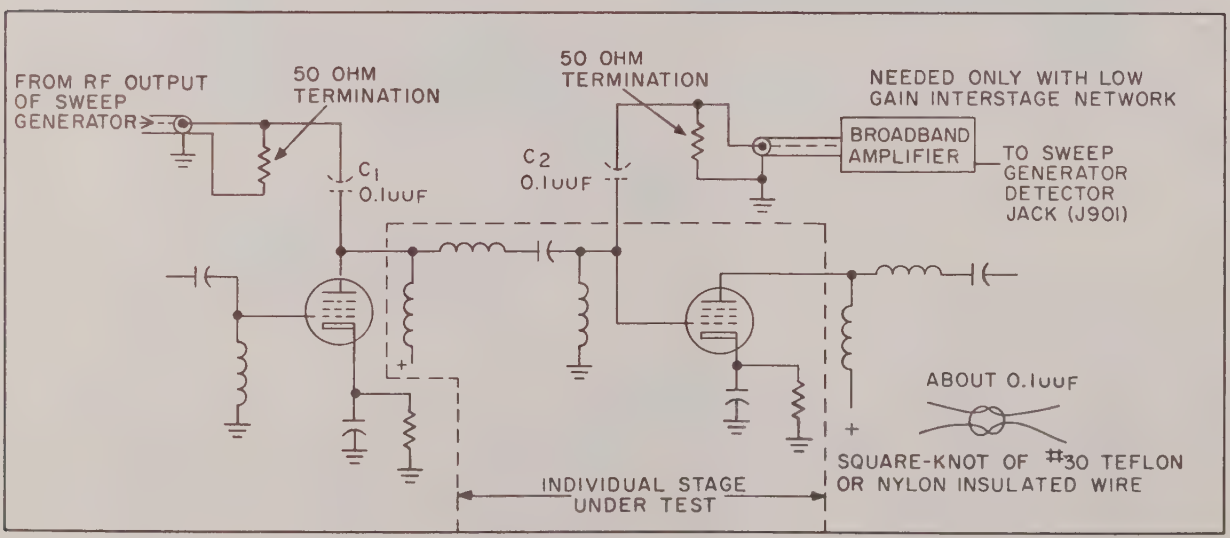


Figure 4-11. Testing an RF Amplifier



A. METHOD I



B. METHOD II

Figure 4-12. Testing an Individual Stage in an Amplifier

a. Connect RF OUTPUT jack J4 of the sweep generator to the input terminals of the amplifier under test, using a matching pad if the input impedance of the amplifier differs from the output impedance (50 ohms) of the sweep generator.

b. Connect the output of the amplifier under test to one DETECTOR jack J902, on the front panel of the sweep generator, using a matching pad if the output of the amplifier is designed for other than 50 ohms.

c. Terminate the other DETECTOR jack J901 with the 50-ohm termination, part number TR-53 (figure 3-2), furnished with the sweep generator.

d. Use the same procedure as described in paragraph 4-22, steps d through j, to obtain the best pattern on the oscilloscope screen.

e. For band width and response curve measurements, make adjustments and measurements as described in paragraph 4-12.

f. If the response curve has sharp changes, refer to paragraphs 4-23 through 4-25.

4-31. MEASUREMENT OF AMPLIFIER GAIN. The gain of any portion of the response curve of the amplifier under test may be measured by the following procedure. (Refer to figure 4-11.)

a. With the equipment set up as described in paragraph 4-30, disconnect the test cables from the amplifier under test. Keep the matching pads attached to the test cables.

b. Connect the two cable ends together, including the matching pads, so that the input cable feeds through both matching pads into the output cable.

c. Set ATTENUATOR db control AT1 on the sweep generator to 0.

d. Adjust RF OUTPUT control R10 until VOLTS meter M103 reads 0 DBM on its bottom scale.

e. With BLANKING switch S10 pulled to OUT position, adjust the oscilloscope vertical amplifier gain control so that the desired portion of the response curve is at a convenient distance from the base line (about 5 centimeters). Make a careful note of this distance.

f. Reconnect the amplifier input and output terminals to the test cables. Do not make any adjustments, even if the oscilloscope pattern leaves the screen.

g. Adjust ATTENUATOR db control AT1 on the sweep generator clockwise until the response curve on the oscilloscope screen returns to a point slightly higher than the position noted in step e.

h. Adjust RF OUTPUT control R10 on the sweep generator counterclockwise until the response curve height is exactly at the position noted in step e.

i. The decibel gain of the amplifier under test is determined by the combined readings of the ATTENUATOR db dial and the DBM reading on VOLTS meter M103. For instance, if the ATTENUATOR db dial is on 30 and the VOLTS meter reads -6 DBM, the amplifier gain is 36 decibels.

4-32. TESTING AN INDIVIDUAL STAGE IN AN AMPLIFIER. The sweep generator may be used to test an individual stage in an amplifier. To accomplish this, connections to the input and output circuits of the individual stage must be made by a method that does not affect its frequency response. Two methods of making this connection are described below. The choice of method depends upon the circuitry of the amplifier to be tested.

4-33. Method I connects to the individual stage directly. Perform the following procedure. (Refer to (A), figure 4-12.)

a. Connect RF OUTPUT jack J4 through a test cable to the grid of the tube preceding the stage to be tested, in series with a 10 uuf capacitor. Keep the connections as short as possible.

b. Insert a 6 to 10 db attenuator in the above test lead for a better response curve presentation.

c. Connect the output of the stage to be tested through a 10 uuf capacitor and a test cable to DETECTOR jack J902 on the sweep generator. Terminate the other DETECTOR jack J901 with the 50 ohm termination, part number TR-53.

d. Use the same procedure as described in paragraph 4-22, steps d through j, to obtain the best display on the oscilloscope screen.

e. Observe the pattern on the oscilloscope screen, making adjustments and measurements as described in paragraph 4-12.

4-34. Method II is used if the individual stage to be tested is part of a feedback circuit involving other stages. This method requires the use of a broadband amplifier whose response is flat beyond the frequency limits of the particular stage to be tested. Use the following procedure to make measurements. (Refer to (B), figure 4-12.)

a. Connect RF OUTPUT jack J4 of the sweep generator through a test cable to the output of the stage previous to the one being tested. Use a series capacitor small enough to have negligible loading effect on the circuit, but large enough to give an adequate response curve display. (A capacity of about 0.1 uuf may be obtained by tying a square knot with two pieces of teflon-insulated hookup wire.)

NOTE

Any coupling method which uses small values of capacitance must be used only with relatively narrow-band circuits (10 percent deviation from center frequency, or less). With wide band amplifiers, the response curve display will be tilted, due to the reactance of the coupling capacitor.

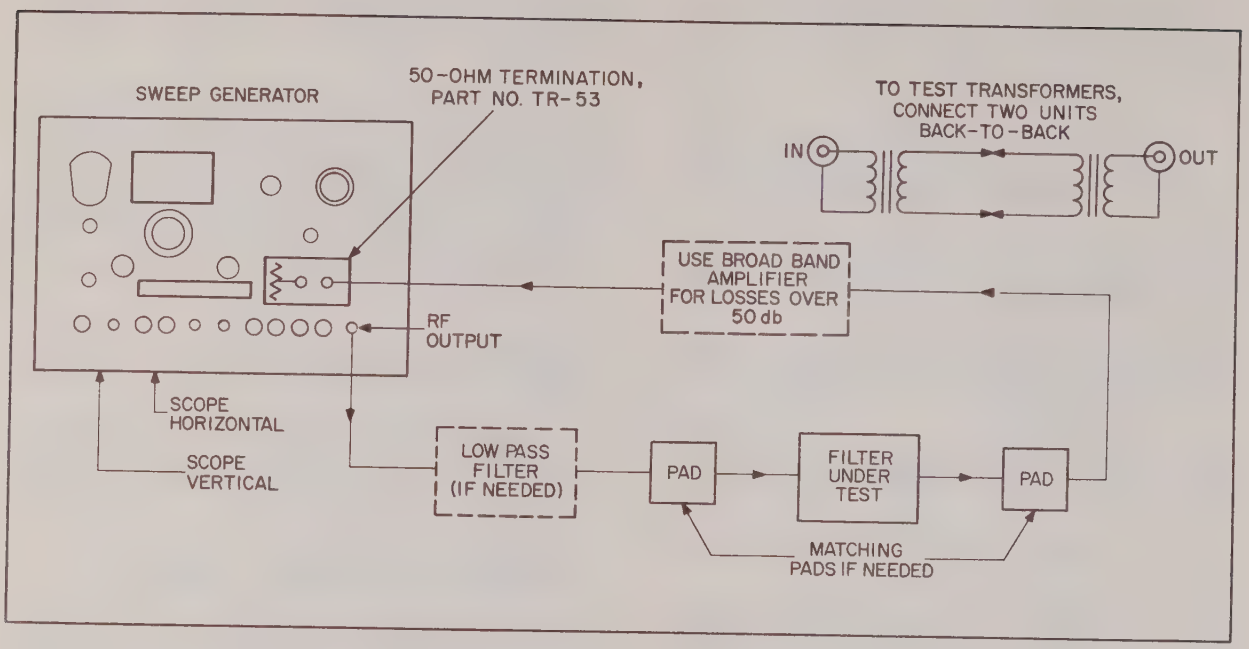


Figure 4-13. Testing Filters or Transformers

b. Connect the output of the transformer or coupling device of the stage being tested to the input of the auxiliary broadband amplifier, again using a small capacitor such as that described in step a, above. Take necessary precautions to prevent stray pickup from nearby circuitry.

c. Connect the output of the auxiliary broadband amplifier to DETECTOR jack J902 on the sweep generator, terminating the other DETECTOR jack J901 with the 50-ohm termination, part number TR-53. If the output impedance of the broadband amplifier is not 50 ohms, use a matching pad.

d. Use the procedure described in paragraph 4-22, steps d through j, to obtain the best display on the oscilloscope screen.

e. Check the effects of the feedback circuits on the stage being tested. Vary the gain of the tube preceding the stage; if the oscilloscope pattern changes, feedback originates in the earlier stages. Vary the gain of the tube following the stage; if the oscilloscope pattern changes, feedback originates in the later stages of the amplifier under test.

f. Observe the pattern on the oscilloscope screen, making adjustments and measurements as described in paragraph 4-12.

4-35. Where the individual stage to be tested is an input or output stage of an amplifier, neither of the above methods will give completely satisfactory results. The use of a voltage comparator, such as the Jerrold Model FD-30 or equivalent, will provide a more accurate and convenient method of making such tests.

4-36. TESTING THE FREQUENCY RESPONSE AND MEASURING THE LOSS OF FILTERS OR TRANSFORMERS. The general technique for measuring radio frequency components is similar to that used for amplifiers. However, since components such as filters and transformers have no self-contained amplification, more system gain is required. The available output voltage and the sensitivity of the preamplifier circuits of the sweep generator will handle insertion losses up to 50 decibels. For higher losses, an auxiliary amplifier is required, having sufficient gain to compensate for these losses, and sufficient band width to cover the frequency response range of the item to be tested. (Refer to figure 4-13.)

4-37. Make the same connections to the sweep generator, and use the same procedure to measure the band width and gain, as described for amplifiers in paragraph 4-29.

4-38. When a filter under test has deep rejection notches within an octave band, the distortion of the oscilloscope display can be minimized by the use of an auxiliary low-pass filter set to cut off just above the octave band. In addition, use the lowest setting of RF OUTPUT control R10 which will provide an adequate display of the response curve.

4-39. Transformers whose secondary impedance differs from the primary impedance may be tested by using two transformers connected back-to-back, as shown in figure 4-13. However, if the transformers are not identical, the response curve will represent the composite response of both transformers rather than the curve of an individual unit.

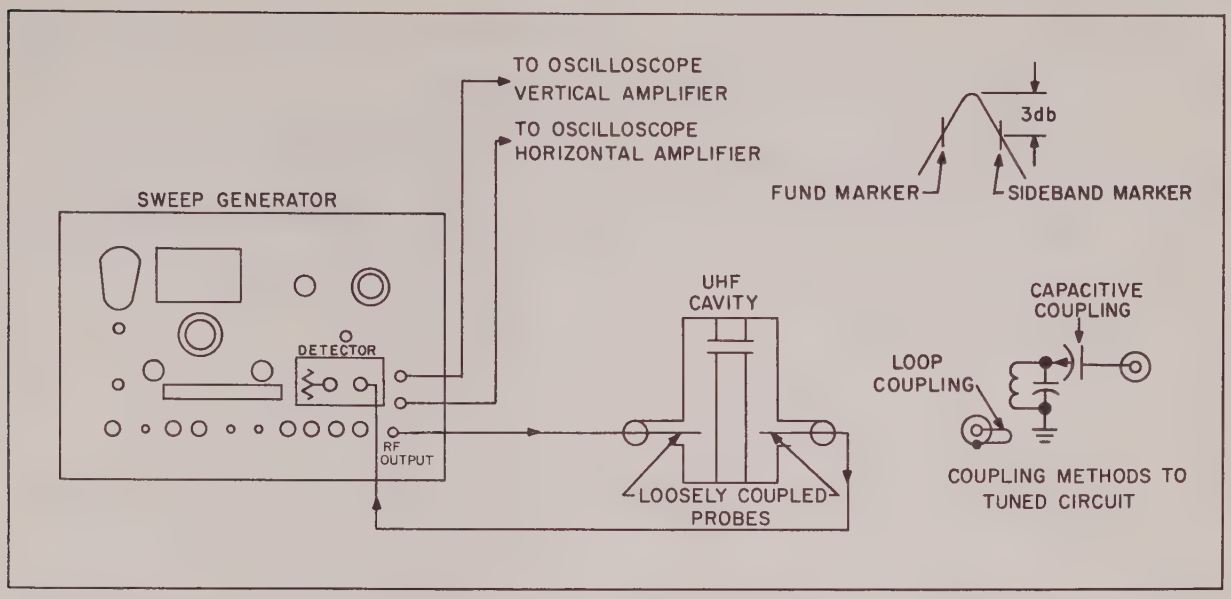


Figure 4-14. Measuring Cavities and Resonant Circuits

4-40. MEASURING THE UNLOADED BAND WIDTH AND "Q" OF CAVITIES OR RESONANT CIRCUITS. The sweep generator may be used to analyze extremely narrow-band radio frequency components, such as resonant cavities and high-Q tuned circuits. Use the following procedure to make these measurements. (Refer to figure 4-14.)

a. Connect the input of the cavity to be tested to RF OUTPUT jack J4 through a test cable. Use a very loose coupling method.

b. Connect the output of the cavity through a test cable to DETECTOR jack J902 on the sweep generator. Terminate the other DETECTOR jack J901 with the 50-ohm termination, part number TR-53. Again use a very loose coupling method.

c. If the device to be tested is a tuned circuit, and does not have a self-contained coupling loop, make up a small coupling loop for use as an input circuit. Use a very small capacitor to couple the test cable to the output of the tuned circuit.

NOTE

It is important to use the least coupling that will provide adequate observation of the response curve. In general, when the coupling gives an insertion loss of 20 db as compared to a direct connection, an error of 5 percent can be expected in the band width. With an insertion loss of 40 db, the band width error is reduced to 1 percent.

d. Follow procedures described in paragraph 4-22, steps d through j, to obtain the best display on the oscilloscope screen.

e. Take necessary precautions to prevent any stray coupling between the two test cables. There should be no response curve display on the oscilloscope with the cavity or tuned circuit completely detuned or shorted out. If various physical placements of the test cables does not completely eliminate the stray coupling, use inductive coupling from one cable to the cavity and capacitive coupling to the other.

f. For a precise measurement of band width, use external sideband markers as described in paragraph 4-18.

g. Observe the pattern on the oscilloscope screen, making adjustments and measurements as described in paragraph 4-12.

4-41. TESTING LOAD IMPEDANCES FOR PROPER MATCHING. The proper matching and the frequency response of an impedance termination of a transmission line system may be measured by the sweep generator and a delay line, which can be made up from coaxial cable, the type and dimensions depending upon the frequency range and the particular type of impedance to be tested. Use the following procedure to make this measurement. (Refer to (A), figure 4-15.)

a. Connect the sweep generator RF OUTPUT jack J4 to DETECTOR input jack J901, using a short length of test cable with UG-88/U connectors.

b. Connect the other DETECTOR jack J902 to a delay line made up of low-loss 50-ohm coaxial cable. The length of this cable should be long enough to include approximately 8 to 10 half-waves on the frequency being measured.

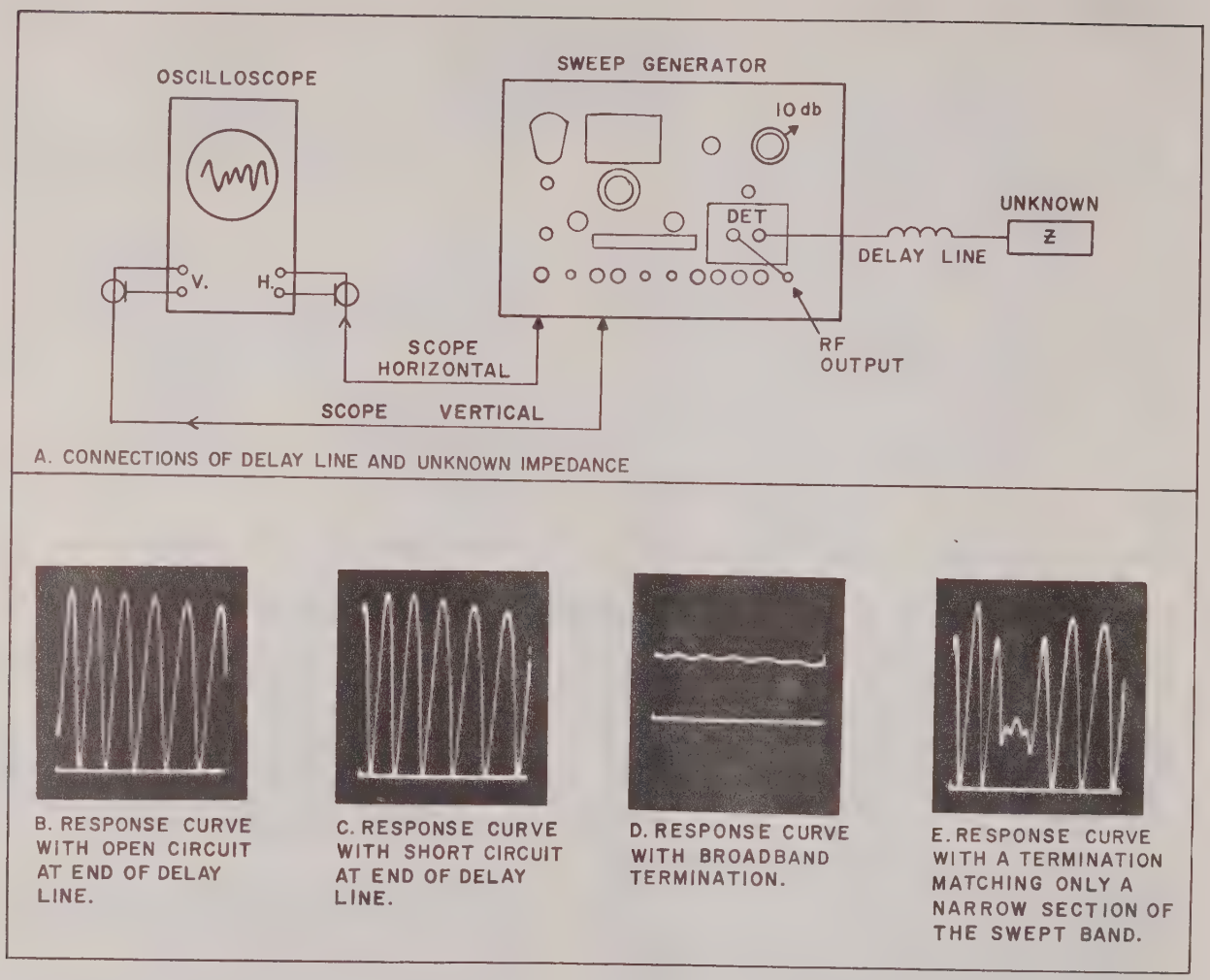

OSCILLOSCOPE
V.
H.
SWEEP GENERATOR
10 db
DET
UNKNOWN
Z
DELAY LINE
SCOPE HORIZONTAL
SCOPE VERTICAL
RF OUTPUT
A. CONNECTIONS OF DELAY LINE AND UNKNOWN IMPEDANCE
B. RESPONSE CURVE WITH OPEN CIRCUIT AT END OF DELAY LINE.
C. RESPONSE CURVE WITH SHORT CIRCUIT AT END OF DELAY LINE.
D. RESPONSE CURVE WITH BROADBAND TERMINATION.
E. RESPONSE CURVE WITH A TERMINATION MATCHING ONLY A NARROW SECTION OF THE SWEPT BAND.

Figure 4-15. Measuring Transmission Line Load Impedance

NOTE

A half-wavelength of cable may be calculated by using either of the following formulas:

(1) For solid polyethylene cables:

$$\text{Length in feet} = \frac{333}{\text{Frequency in MC}}$$

(2) For air dielectric cables:

$$\text{Length in feet} = \frac{492}{\text{Frequency in MC}}$$

c. Use the procedure described in paragraph 4-22, steps d through j, to obtain the best display on the oscilloscope screen.

d. Observe the oscilloscope display and compare to (B), figure 4-15. The loops represent standing waves reflected back from the open end of the cable, the number of loops depending upon the frequency and length of cable. A pattern that resembles (C), figure 4-15, will be observed when the far end of the cable is short-circuited.

e. Terminate the far end of the delay line with the impedance to be analyzed. Use the proper fittings to avoid any additional mismatch problems.

f. If the impedance termination is resistive or broadband and matches the impedance of the delay line, the loops will straighten out into a nearly straight line as in patter (D), figure 4-15.

g. If the impedance has only a narrow-band matching characteristic, only a few of the loops will be straightened out, corresponding to the frequencies at which the delay line is matched, as shown in pattern (E), figure 4-15.

4-42. USE OF EXTERNAL WOBBULATOR DRIVE FREQUENCIES.

4-43. If other than the built-in 60 cycle sweep frequency is required for special tests, an external drive voltage may be connected at the rear of the power supply chassis. Use the following procedure:

a. Disconnect the jumper from terminals 2 and 3 on the terminal strip marked EXT WOBB DRIVE TB1, (3, figure 4-3).

b. Connect an external sweep voltage, from dc to 60 cycles, not to exceed 3 volts, between terminals 1 and 2 of TB1.

c. The maximum and minimum sweep widths obtainable from this external voltage may still be controlled with SWEEP WIDTH switch S3 and SWEEP WIDTH control R9.

SECTION V

MAINTENANCE INSTRUCTIONS

5-1. PREVENTIVE MAINTENANCE.

5-2. The maintenance instructions contained in this section pertain to periodic work performed on the sweep generator while it is still operable. The purpose of this maintenance is to inspect the equipment for deteriorated or defective parts before they affect the overall performance of the sweep generator, and to maintain the cleanliness of the equipment. If the sweep generator is inoperative or malfunctioning, refer directly to troubleshooting in Section VI.

5-3. FREQUENCY OF MAINTENANCE

5-4. The frequency of maintenance depends upon the conditions under which the equipment is used. Under normal laboratory conditions, the following maintenance should be performed after each 1000 hours of use, or every three months, whichever occurs first.

5-5. VISUAL INSPECTION. Make a thorough visual inspection of the sweep generator with the power cord disconnected from the supply line, and the sweep generator removed from its cabinet. Include the following items in the visual inspection:

a. Inspect all controls (figure 4-2) for damage, looseness, scraping or bent shafts.

b. Inspect meter (figure 4-2) for broken glass, damaged pointer or damaged face.

c. Inspect all plugs and connectors (figures 4-2 and 4-3) for broken or bent pins, cracked insulation, and evidence of corrosion.

d. Inspect all subassembly chassis and mounted components (figures 4-6 and 7-3) for loose or missing hardware.

e. Inspect all wiring for frayed insulation and broken lacing.

f. Inspect all components and wiring for indications of charring or overheating.

g. Make sure that electron tubes and plug-in components are firmly seated in their sockets.

h. Replace defective parts as required.

5-6. ELECTRICAL INSPECTION. Make an electrical inspection, including the following general areas of inspection. For a complete detailed electrical inspection, refer to troubleshooting in Section VI, paragraph 6-3.

a. Test all electron tubes except V201 and V601 on a high quality tube tester, replacing those which are weak or defective.

NOTE

Do not test electron tubes V201 and V601, since they are difficult to remove and cannot be tested in a standard type tube tester. Refer to paragraph 8-15 for removal of tubes V201 and V601.

b. Insert the power cord into its normal supply line receptacle. Inspect the eight pilot lights DS3 through DS10 in the FREQUENCY MEGACYCLES dial to see if they all light properly.

5-7. CLEANING. Remove accumulated oil, dirt, or other foreign matter from the external surfaces of the equipment, using a soft, lint free cloth and cleaning solvent, Federal Specification P-S-661. Use a soft, clean brush and a vacuum cleaner to remove dust and loose dry material from the interior of the sweep generator.

5-8. LUBRICATION. Two areas of the sweep generator require lubrication. Apply a small amount of type MIL-G-3278 grease, or equivalent, on the bearings and gear surfaces of the FREQUENCY MEGACYCLES dial gear train, and to the moving parts of SWEEP WIDTH switch S3. (Refer to figure 7-10.)

SECTION VI

TROUBLESHOOTING

6-1. TROUBLESHOOTING SEQUENCE.

6-2. The first step in troubleshooting a multiple-unit piece of equipment such as the sweep generator is to attempt to isolate the trouble to one particular unit. A logical troubleshooting sequence will pinpoint the defective section in the least amount of time and will avoid disturbing sections which are operating normally.

6-3. Before making any detailed diagnosis, operate all of the various functions of the sweep generator to determine exactly what is malfunctioning. Refer to paragraphs 4-6 through 4-9 for a complete procedure. Perform each operation, noting carefully any function of the sweep generator which is not operating normally.

6-4. Refer to troubleshooting in figure 6-1 as a guide to correcting malfunctions. Compare the malfunction to the list of troubles given and make the corrections required. Test points for electrical measurements are designated by a number within a circle. These test points are shown on the schematic diagrams, figures 6-5 through 6-9. If the correction requires the removal of a subassembly, refer to repair instructions in Section VIII.

Trouble	Test Point	Probable Cause	Remedy
No output voltage, UHF or VHF.		Fuses F2 or F3 blown.	Check high voltage circuits for short circuits or defective components.
		No power supply voltage; defective rectifiers CR1, CR2, CR3, CR4 or CR5.	Replace defective rectifiers, observing proper polarity. If proper power supply voltages are not obtained, check other power supply components.
		Loose or defective connectors J16 or P15 to sweep oscillator.	Check connectors J16 or P15 for damage or loose fit.
		Defective BAND SELECTOR switch S5.	Check by inserting a UG-914/U connector in place of switch; if operation is restored, replace S5.
		Defective sweep oscillator tube V601.	Replace V601; adjustment of feedback tab and calibration check required after replacement.
	① Fig. 6-5	Shorted or open RF probe assembly CP2.	Remove probe cable from J7 and measure resistance. Should be 50 to 75 ohms. Replace entire cable assembly if probe is shorted or more than 75 ohms. Calibration check required after replacement.
	Fig. 6-6	Defective ALC amplifier tubes V301, V302, V303 and V304.	Check tubes by substituting a known good tube; replace those found defective.
		Out-of-tolerance voltages in ALC amplifier.	Refer to figure 6-2 for proper voltages. If beyond limits, check components for proper values.
		Shorted or open filters FL601, FL602 and FL603 in sweep oscillator assembly.	Replace defective filters.

Figure 6-1. Troubleshooting (Sheet 1 of 4)

Trouble	Test Point	Probable Cause	Remedy
No output voltage on VHF but normal output voltage on UHF.	(2) Fig. 6-5	Defective VHF oscillator tube V201.	Measure dc current at FL202; if over 20 milliamperes, replace V201. Calibration check required after replacement.
	(2) (3) Fig. 6-5	Incorrect voltages on VHF oscillator tube V201.	Measure voltages at FL201 and FL202 and compare with figure 6-4. If incorrect, check pertinent components in power supply section.
		Loose or defective cables or connectors to mixer P701, P702, P4 or J302.	Check cables and connectors for damage or loose fit.
		Defective BAND SELECTOR switch S5.	Check by inserting a UG-914/U connector in place of switch. If operation is restored, replace S5.
		Relay K3 not operating when BAND SELECTOR switch S5 is on VHF position.	Check operation of K3 and S5. Replace defective components.
		Defective diodes CR701 and CR702.	Check front-to-back ratio of CR701 and CR702. (Refer to paragraph 6-13.) Replace if defective. Calibration check required after replacement.
Insufficient output voltage on both UHF and VHF.	Fig. 6-7	Loose or corroded connectors P15 or J16 on power supply chassis.	Check connectors for loose fit or evidence of corrosion.
		Defective sweep oscillator tube V601.	Replace V601. Adjustment of feedback tab and calibration check required after replacement.
		RF PROBE CP2 improperly adjusted.	Adjust probe. (Refer to paragraphs 7-16 and 7-19 for proper adjustment procedure.)
Moving FREQUENCY MEGACYCLES dial causes oscilloscope display to jump and disappear at times.	Fig. 4-6	Defective sliding contacts inside the sweep head cavity.	Replace complete sweep oscillator. (Refer to paragraph 8-22.)
No ALC action on either UHF or VHF outputs.		Defective ALC amplifier tubes V301, V302, V303 and V304.	Measure voltages and compare with figure 6-2. If incorrect, check pertinent components in ALC and power supply sections.
ALC action normal on UHF but not on VHF, or vice versa.	(4) Fig. 6-6	Relay K3 not closing on VHF operation.	Check coil of K3 for open winding; check to see that 5 volts dc appears at coil terminals when BAND SELECTOR switch S5 is in VHF position. Check contacts and wiring on rotary switch portion of S5.

Figure 6-1. Troubleshooting (Sheet 2 of 4)

Trouble	Test Point	Probable Cause	Remedy
		Dirty contacts on relay K3.	Clean relay contacts carefully with suitable contact cleaning compound.
	⑤ ⑥ ⑦ ⑧ Fig. 6-5	If only VHF ALC is inoperative, defective diodes CR703 and CR704. If only UHF ALC is inoperative, defective diodes CR701 and CR702.	Remove diodes (paragraphs 8-7 or 8-9) and measure front-to-back ratio. (Refer to paragraph 6-13.) Replace defective diodes.
ALC action not complete: only partial flattening of response curve.		Incorrect connections of external test arrangement.	Feed output of sweep generator through detector directly to oscilloscope. If ALC action is normal, review external connections.
ALC action normal, but low frequency end of VHF response curve rises sharply.		Defective diodes CR703 and CR704 in mixer unit. Diodes installed with incorrect polarity.	Remove diodes (paragraph 8-12) and measure front-to-back radio. (Refer to paragraph 6-13.) Replace defective diodes.
Insufficient sweep width.		Insufficient warmup time.	Allow the sweep generator to warm up for at least 30 minutes.
	Fig. 6-7	Incorrect adjustment of WOBB DRIVE LIMIT control R6.	With SWEEP WIDTH control R9 at maximum, adjust R6 clockwise until wobbulator assembly just begins to chatter.
	⑨ Fig. 6-7	Defective wobbulator assembly.	Excursion of wobbulator capacitor C601 should be 1/4 inch with 3 volts ac applied to terminals of wobbulator assembly coil. If excursion is less, replace complete wobbulator assembly.
No sweep width.	Fig. 4-3	Jumper missing from terminals 2 and 3 of EXT WOBB DRIVE terminal strip TB1 on rear panel.	Install missing jumper.
	⑨ Fig. 6-7	Defective R6, R9, T3, C10, C11, J16 or P15 in power supply section.	Voltage at coil of wobbulator assembly should be 3 volts ac at maximum sweep width. If less, check all components listed.
	⑨ Fig. 6-7	Shorted or open coil on wobbulator assembly.	Coil resistance should be 3 ohms. If defective, replace complete wobbulator assembly.
Sweep width erratic: breaks up when SWEEP WIDTH control R9 is rotated.		Wobbulator capacitor C601 rubbing together, or dirt between plates.	Remove wobbulator carefully without disturbing capstan screws. If dirty, clean carefully. If plates are bent, replace wobbulator assembly.
Blanking will not function when BLANKING switch S10 is pulled out.		Defective blanking amplifier tube V306.	Check tube and replace if defective.
		Defective switch S10.	Replace entire control and switch R8, S10.

Figure 6-1. Troubleshooting (Sheet 3 of 4)

Trouble	Test Point	Probable Cause	Remedy
		Incorrect voltages on tube V306.	Measure voltages and compare with figure 6-2. If incorrect, check pertinent components in power supply and blanking amplifier sections. Replace defective components.
Preamplifier dc balance cannot be obtained with BALANCE control R527.	Fig. 6-8	Unbalanced halves of preamplifier tube V501.	Replace with a more closely balanced tube.
		Unbalanced components in preamplifier input stages.	All components are matched for balance; check following pairs for match: R501-R502, R503-R504, R526-R535, R507-R510, R508-R509, R511-R512. Replace pairs unbalanced more than 5 percent.
Oscilloscope display unstable when sweep generator cabinet is jarred.		Preamplifier tube V501 is microphonic.	Replace V501 with a quieter tube.
		Loose connector or cable at jacks J1A or J501A.	Check cable connections for proper fit.
Markers do not change to NARROW when SWEEP WIDTH switch S3 is on NARROW position.	(10) Fig. 6-8	Relay K1 not energized in NARROW position.	Check coil of K1 for open winding: check to see than 5 volts dc appears at coil terminals. Check contacts and wiring on rotary switch portion of SWEEP WIDTH switch S3. Replace defective components.
		Dirty contacts of SWEEP WIDTH switch relay K1.	Clean relay contacts carefully with suitable contact cleaning compound.
Markers will not appear on oscilloscope display when MARKER GAIN controls are adjusted.		Oscilloscope setting incorrect.	Adjust vertical amplifier on oscilloscope for sensitivity of 0.1 volts per centimeter.
		Incorrect external connections.	Make sure that detected signal is fed through the preamplifier, where marker signals are mixed with the test signal.
	Fig. 6-9	Defective oscillator tube V401.	Check tube and replace if defective.
		Incorrect voltages in harmonic marker generator.	Measure voltages and compare with figure 6-2. If incorrect, check pertinent components in power supply and harmonic marker generator sections.
	(11) Fig. 6-5	Defective probe CP3, cable and connector P6 from sweep oscillator to marker input jack J401.	Remove connector P6 from jack J401. Measure resistance at end of P6; it should read 50 to 75 ohms. Replace if less than 50 or more than 75 ohms.
	Fig. 6-9	Defective 5 mc crystal Y401.	Replace with known good crystal.
10 MC and 100 MC Markers missing but 1 MC markers normal.	(12) (13) Fig. 6-9	10 MC and 100 MC multipliers properly adjusted or not functioning.	Measure voltages at test points on harmonic marker chassis. 10 MC test point should measure 15 volts ac and 100 MC test point should measure 1 volt ac.

Figure 6-1. Troubleshooting (Sheet 4 of 4)

	D-C Voltages								
	Socket Pin Numbers								
Tubes	1	2	3	4	5	6	7	8	9
V1	+150	0	0	0	+150	0	0		
V2	0	-150	0	-150	0	0	-150		
V301	+1	+4	6.3 AC	6.3 AC	+60	+100	+4		
V302	+1	+4	6.3 AC	6.3 AC	+60	+100	+4		
V303	-150	-150	-150	6.3 AC	6.3 AC	NC	-80	-80	-50
V304	-150	-150	-150	6.3 AC	6.3 AC	NC	-120	-120	-50
V305	+75	0	+3	6.3 AC	6.3 AC	+75	+1	+2.5	NC
V306	+90	-4	0	6.3 AC	6.3 AC	+60	-180	-150	6.3 AC
V401	+30	-7	0	0	6.3 AC	+110	-12	0	0
V402	-8	0	6.3 AC	0	+275	+145	0		
V403	+175	-1.5	0	0	6.3 AC	+175	-6	0	0
V501	+25	0	+1	0	+5	+25	0	+1	NC
V502	-2.5	0	0	+5	+150	+150	0		
V503	+145	0	+1.7	+5	+5	+148	0	+1.7	0
Transistors									
Q501	+25	+25	-2	0					
Q502	+25	+25	-2	0					

Figure 6-2. Circuit Voltage Measurements

6-5. Except for the replacement of a few minor components in the power supply section, repairs performed on any section of the sweep generator will require a calibration check and possible recalibration of certain portions of the equipment. Refer to calibration procedures in Section VII.

6-6. MEASUREMENT OF CIRCUIT VOLTAGES.

6-7. The voltages to be expected at the tube and transistor socket terminals under normal operating conditions, are listed in figure 6-2. Observe and perform the following procedures:

a. Measure all voltages with an RCA Type WV-77E Voltohymst or equivalent.

b. Voltages listed are dc and should be measured between the socket terminal and chassis ground except for the a-c filament voltages, which are measured between the terminals listed in the table. Tolerance for all voltages is 10 percent.

c. Voltages which vary when a control is rotated are listed at their maximum values.

d. BLANKING switch S10 and all four MARKER GAIN control switches S6 through S9 should be in the OUT position for these measurements.

e. All tubes and transistors should be in their sockets, drawing normal currents.

Tubes	Circuit Function	Resistance								
		Socket Pin Numbers								
		1	2	3	4	5	6	7	8	9
V1	Neg. 150V Regulator	19 K	0	NC	0	19 K	NC	0		
V2	Pos. 150V Regulator	0	15 K	NC	15 K	0	NC	15 K		
V301	ALC Input Amplifier	45 K	200 K	10	10	500 K	150 K	200 K		
V302	ALC Input Amplifier	6 K	200 K	10	10	500 K	150 K	200 K		
V303	ALC Output Amplifier	1.4 M	1.4 M	70 K	10	10	NC	inf.	inf.	10 K
V304	ALC Output Amplifier	1 M	1 M	70 K	10	10	NC	4.4 K	4.4 K	10 K
V305	Meter Amplifier	170 K	470	280 K	10	10	170 K	40 K	250 K	NC
V306	Blanking Control	500 K	3.3 M	0	10	10	500 K	3.3 M	15 K	10
V401	5 MC Oscillator and 1 MC Multivibrator	75 K	100 K	0	0	0	25 K	12 K	0	0
V402	10 MC Doubler	2.2 M	0	0	0	24 K	120 K	0		
V403	100 MC Multiplier	120 K	100 K	0	0	0	120 K	47 K	0	0
V501	Preamplifier Input	270 K	340 K	40 K	1	0	370 K	300 K	40 K	NC
V502	Preamplifier Output	450 K	0	0	1	19 K	19 K	130 K		
V503	Birdy Marker Amplifier	20 K	inf.	1 K	1	1	7.5 K	100 K	1 K	0
Transistors										
Q501	Preamplifier Second Stage	4.5 K	6.9 K	50 K	0					
Q502	Preamplifier Second Stage	4.5 K	6.9 K	50 K	0					

Figure 6-3. Circuit Resistance Table

Tubes	Function	Tube Element	Points of Measurement	Normal Voltage	Normal Resistance
V601	Sweep Oscillator	Cathode	FL601 to Gnd	-80 dc	Infinity
		Heater	FL601 to FL602	6.3 ac	0
		Plate	No Measurement		
		Grid	Grid to Cathode	No Measurement	4.7 K
V201	Fixed Oscillator	Cathode	No Measurement		
		Heater	FL201 to Gnd	6.3 ac	0
		Plate	FL202 to Gnd	+ 100 ± 35% dc	40 K
		Grid	Grid to Gnd	No Measurement	4.7 K

Figure 6-4. RF Tubes Voltage and Resistance Table

6-8. MEASUREMENT OF CIRCUIT RESISTANCES.

6-9. The resistances expected at tube and transistor socket terminals under normal conditions are listed in figure 6-3. Observe and perform the following procedures:

a. Make all measurements with the sweep generator power cord disconnected from the supply source.

b. Make all resistance measurements with an RCA Type WV-77E Voltohmyst or equivalent.

c. Resistances are listed in ohms and should be measured between the terminals listed and chassis ground. Tolerance for all resistance measurements is 10 percent.

d. Resistances which vary when a control is operated are listed at their maximum values.

e. All tubes and transistors should be in their sockets, since some measurements depend upon an internal jumper connection in the tube envelope.

6-10. RF OSCILLATOR TUBE VOLTAGES AND RESISTANCES.

6-11. Resistance and voltage measurements of the two RF oscillator tubes V201 and V601 are listed in figure 6-4. Only those voltages shown in figure 6-4 should be measured, since any other measurements will cause the tubes to stop oscillating and will produce erroneous readings.

6-12. SEMICONDUCTOR DIODE RESISTANCES.

6-13. When instructions are given in the troubleshooting chart, figure 6-1, to check the front-to-back ratio of the semiconductor diodes, use the following procedure:

a. Remove the diodes from the sweep generator subassembly, following the instructions given in Section VIII, Repair Instructions. Observe the polarity of the diodes as they are removed, so that they may be reinstalled properly.

b. Set the RCA Voltohmyst on the RX 10K resistance scale.

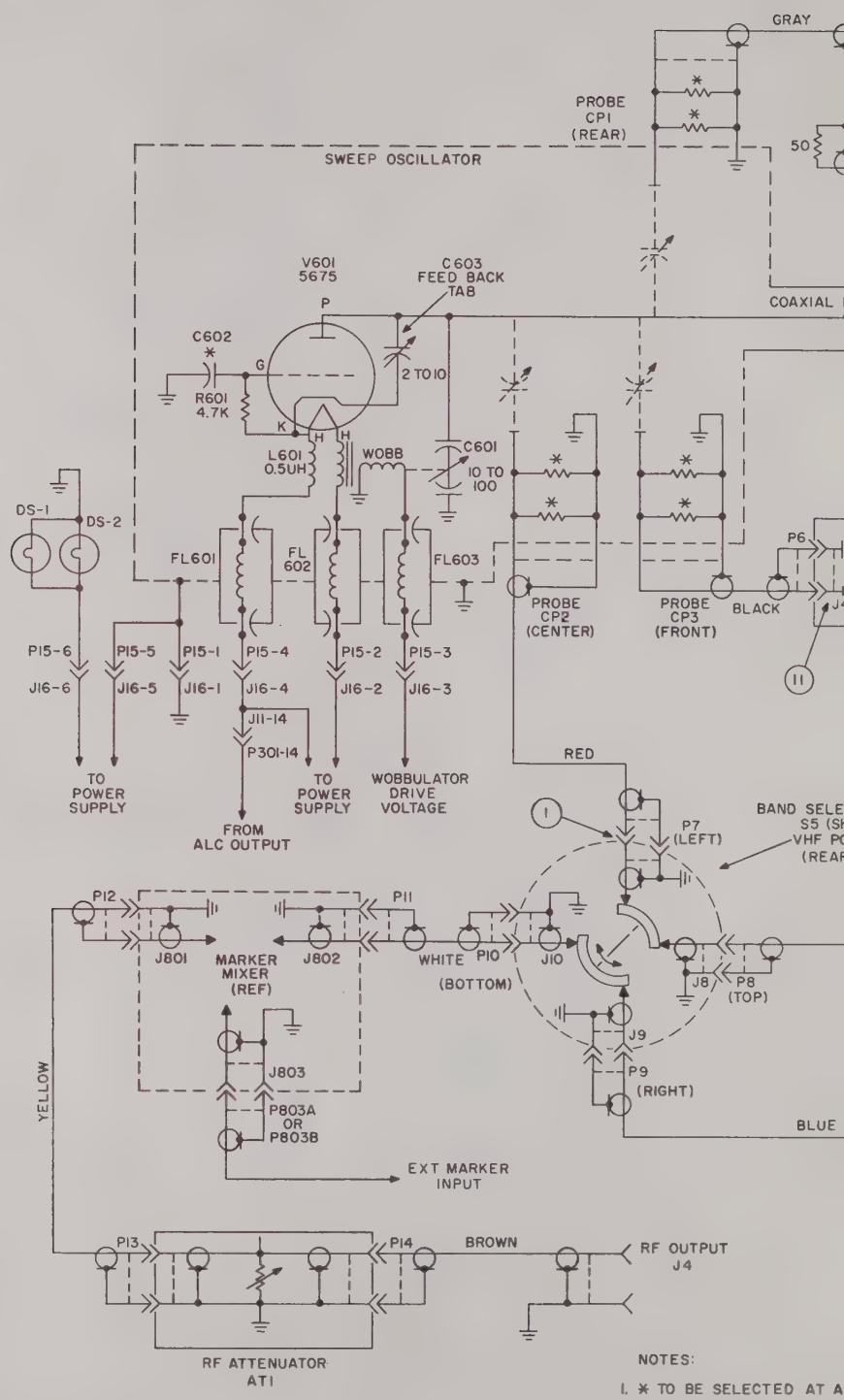
c. Measure the resistance of the suspected diode in both directions by reversing the test probes on the diode terminals. Record the higher of the two resistances measured.

d. Set the Voltohmyst on the RX10 resistance scale.

e. Again measure the resistance of the suspected diode in both directions and record the lower of the two resistances measured.

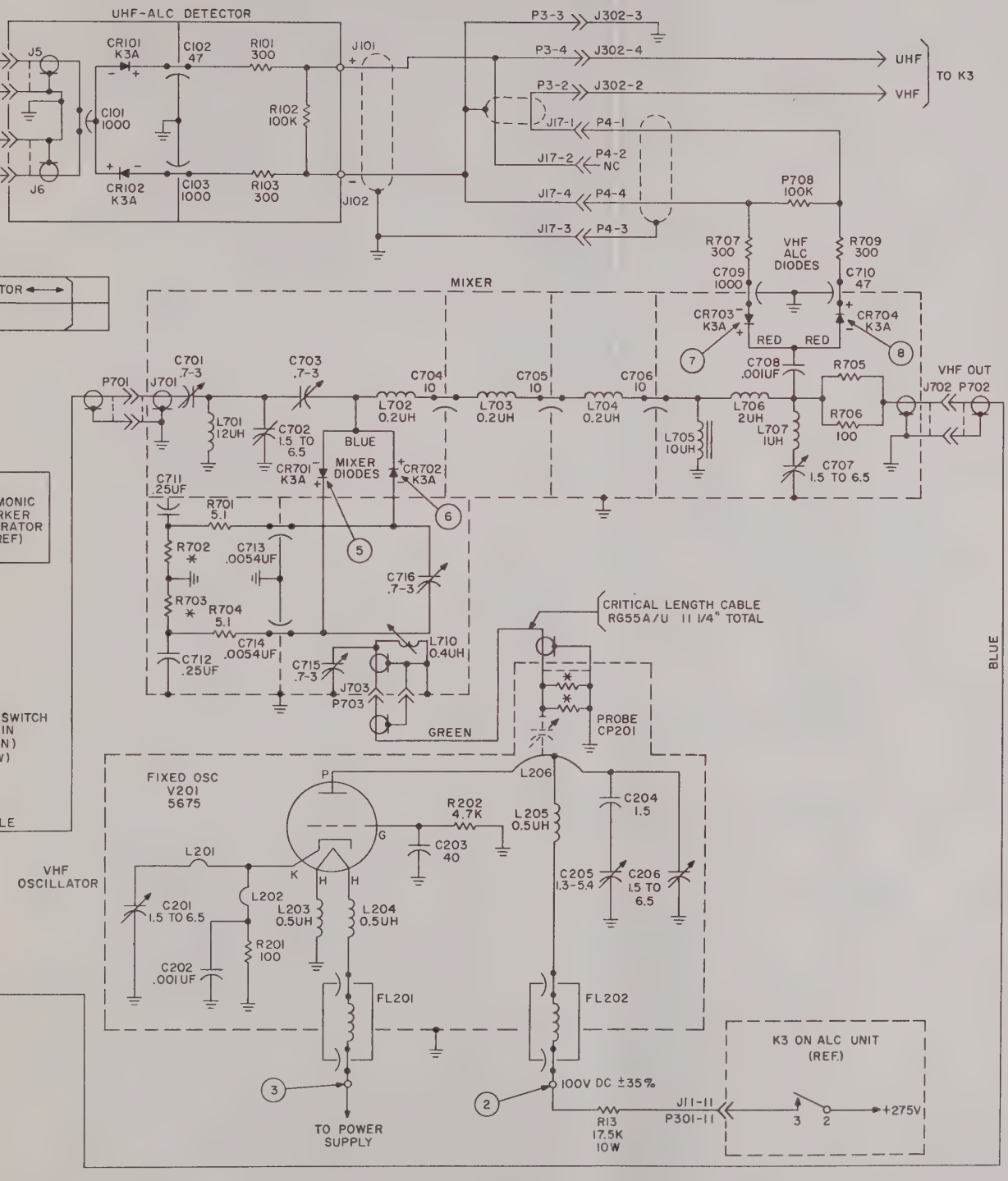
f. Compare the higher and the lower resistance readings (steps c and e). The lower reading should fall between 100 and 200 ohms, and the higher reading should fall between 50,000 and 200,000 ohms.

g. If the suspected diode falls outside these limits, discard it and replace with a known good diode.



NOTES:

1. * TO BE SELECTED AT A
2. ALL RESISTOR VALUES IN
3. ALL CAPACITOR VALUES IN

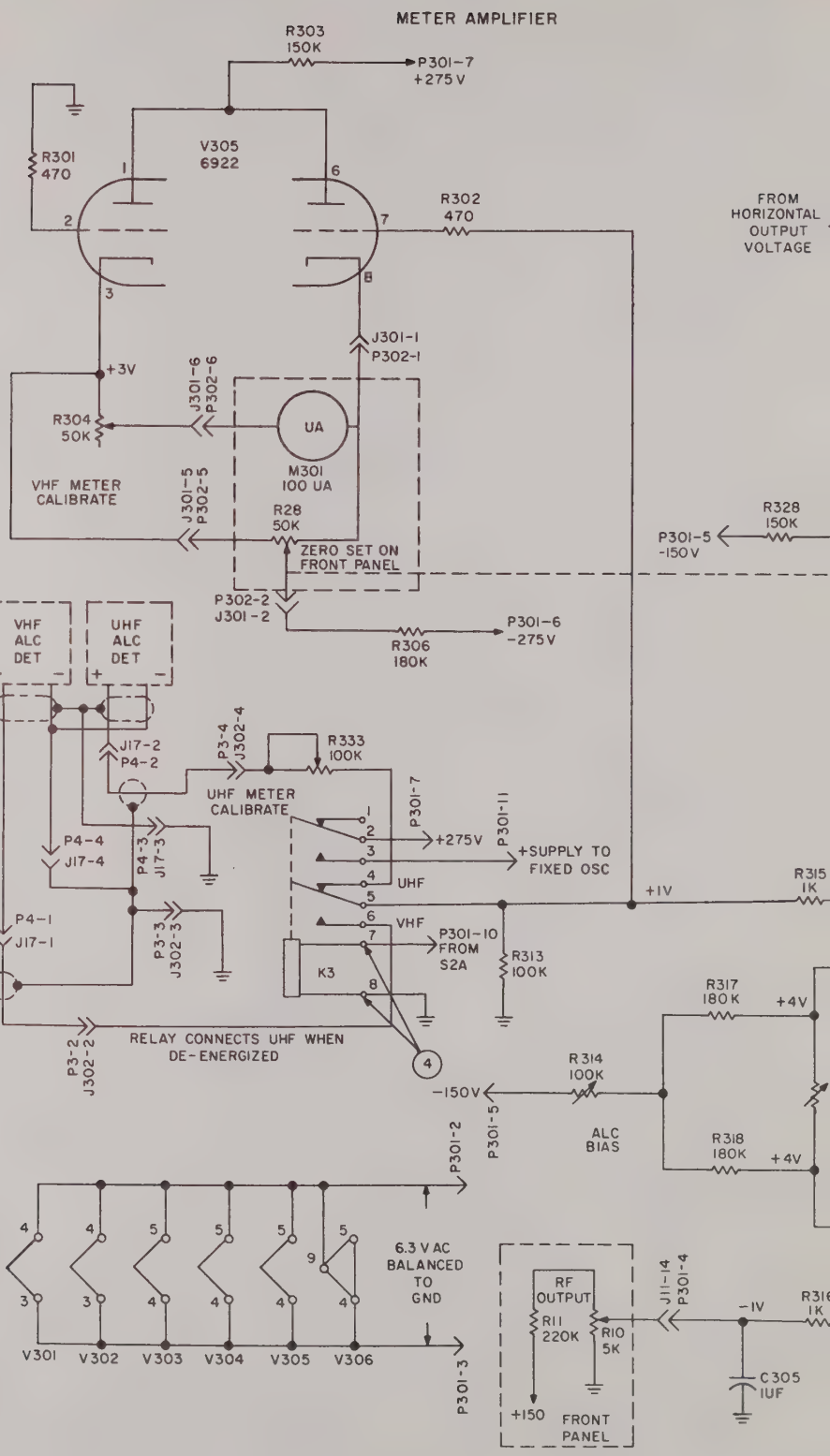


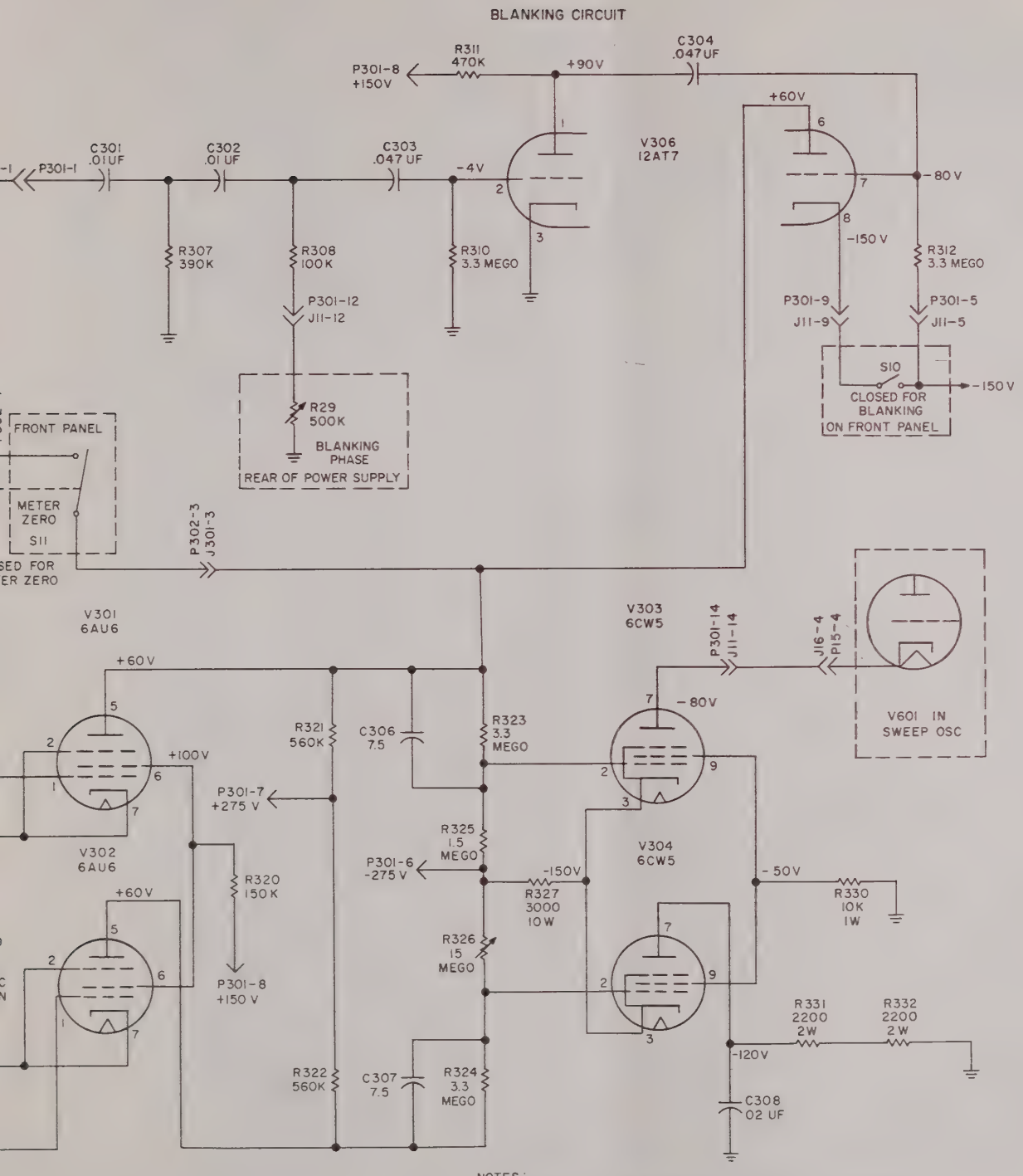
BLY.

S, 1/2 WATT, UNLESS OTHERWISE SPECIFIED.

UNLESS OTHERWISE SPECIFIED.

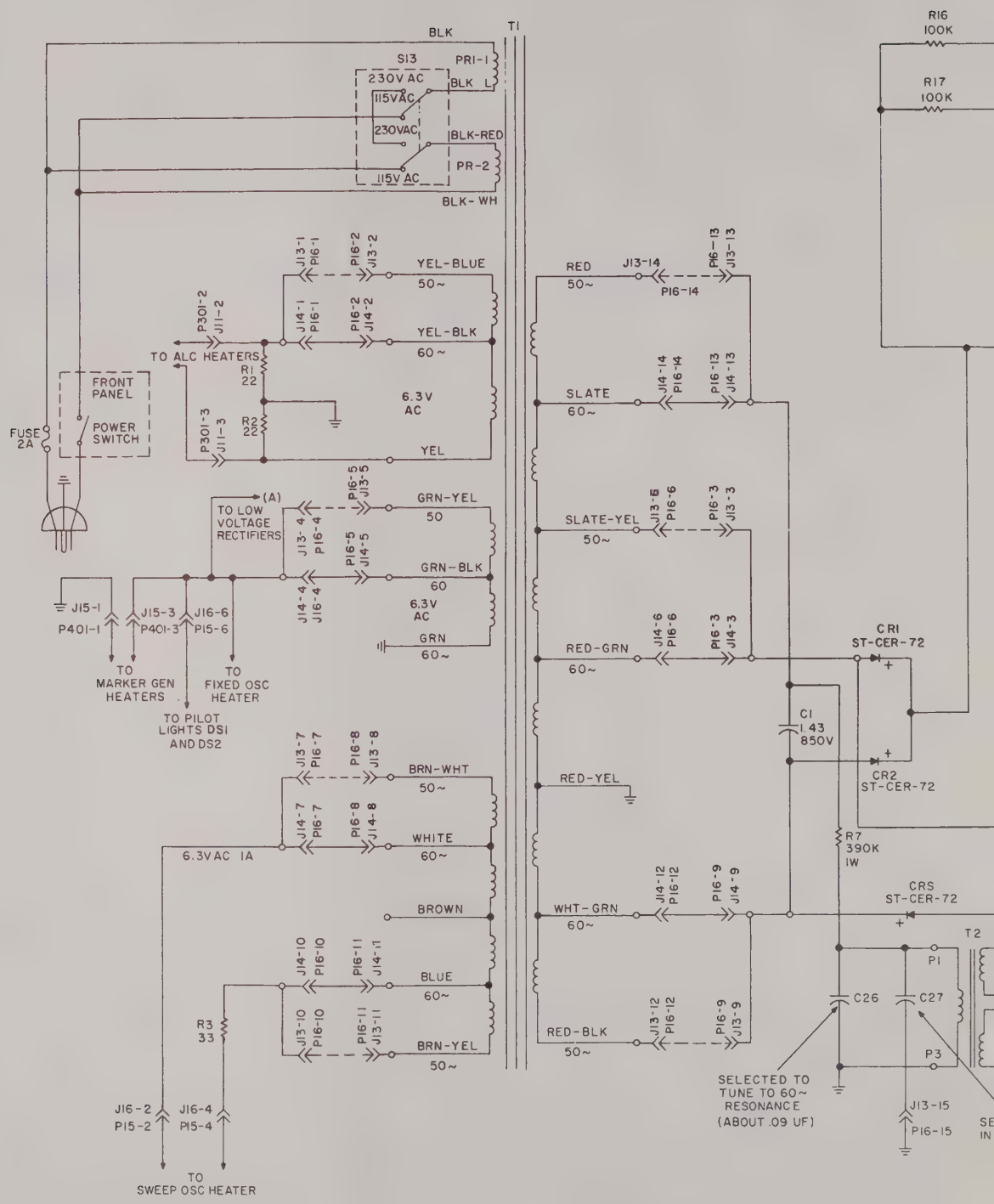
Figure 6-5. RF Circuit Schematic


METER AMPLIFIER
R303
150K
P301-7
+275 V
R301
470
V305
6922
R302
470
FROM
HORIZONTAL
OUTPUT
VOLTAGE
J301-1
P302-1
+3V
J301-6
P302-6
R304
50K
UA
M301
100 UA
VHF METER
CALIBRATE
J301-5
P302-5
R28
50K
ZERO SET ON
FRONT PANEL
R328
150K
P301-5
-150 V
P302-2
J301-2
P301-6
-275 V
R306
180K
VHF
ALC
DET
UHF
ALC
DET
J17-2
P4-2
P3-4
J302-4
R333
100K
UHF METER
CALIBRATE
P301-7
P301-11
+275V
+SUPPLY TO
FIXED OSC
P4-4
J17-4
P4-3
J17-3
UHF
+1V
R315
1K
P4-1
J17-1
P3-3
J302-3
VHF
P301-10
FROM
S2A
R313
100K
K3
R317
180K
+4V
P3-2
J302-2
RELAY CONNECTS UHF WHEN
DE-ENERGIZED
R314
100K
-150V
P301-5
ALC
BIAS
R318
180K
+4V
P301-2
6.3 V AC
BALANCED
TO
GND
V301
V302
V303
V304
V305
V306
P301-3
RF
OUTPUT
R11
220K
R10
5K
+150
FRONT
PANEL
J11-14
P301-4
-1V
R316
1K
C305
1UF



NOTES:
1. ALL RESISTOR VALUES IN OHMS, 1/2 WATT UNLESS OTHERWISE SPECIFIED
2. ALL CAPACITOR VALUES IN UUF, UNLESS OTHERWISE SPECIFIED
3. ALL INDICATED CIRCUIT VOLTAGES ARE DC EXCEPT FILAMENTS

Figure 6-6. ALC, Blanking and Meter Amplifier Schematic


T1
BLK
S13
PRI-1
230V AC
BLK
115VAC
230VAC
BLK-RED
PR-2
115V AC
BLK-WH
FUSE 2A
FRONT PANEL
POWER SWITCH
TO ALC HEATERS
R1 22
R2 22
6.3V AC
YEL
YEL-BLUE
YEL-BLK
50~
60~
(A)
TO LOW VOLTAGE RECTIFIERS
GRN-YEL
GRN-BLK
GRN
50
60
J15-1
P401-1
J15-3
P401-3
J16-6
P15-6
TO MARKER GEN HEATERS
TO FIXED OSC HEATER
TO PILOT LIGHTS DS1 AND DS2
BRN-WHT
WHITE
BROWN
BLUE
BRN-YEL
6.3VAC 1A
R3 33
J16-2
P15-2
J16-4
P15-4
TO SWEEP OSC HEATER
RED
SLATE
SLATE-YEL
RED-GRN
RED-YEL
WHT-GRN
RED-BLK
J13-14
P16-14
R16 100K
R17 100K
CR1 ST-CER-72
CR2 ST-CER-72
CR5 ST-CER-72
C1 1.43 850V
R7 390K 1W
T2
P1
P3
C26
C27
SELECTED TO TUNE TO 60~ RESONANCE (ABOUT .09 UF)
J13-15
P16-15

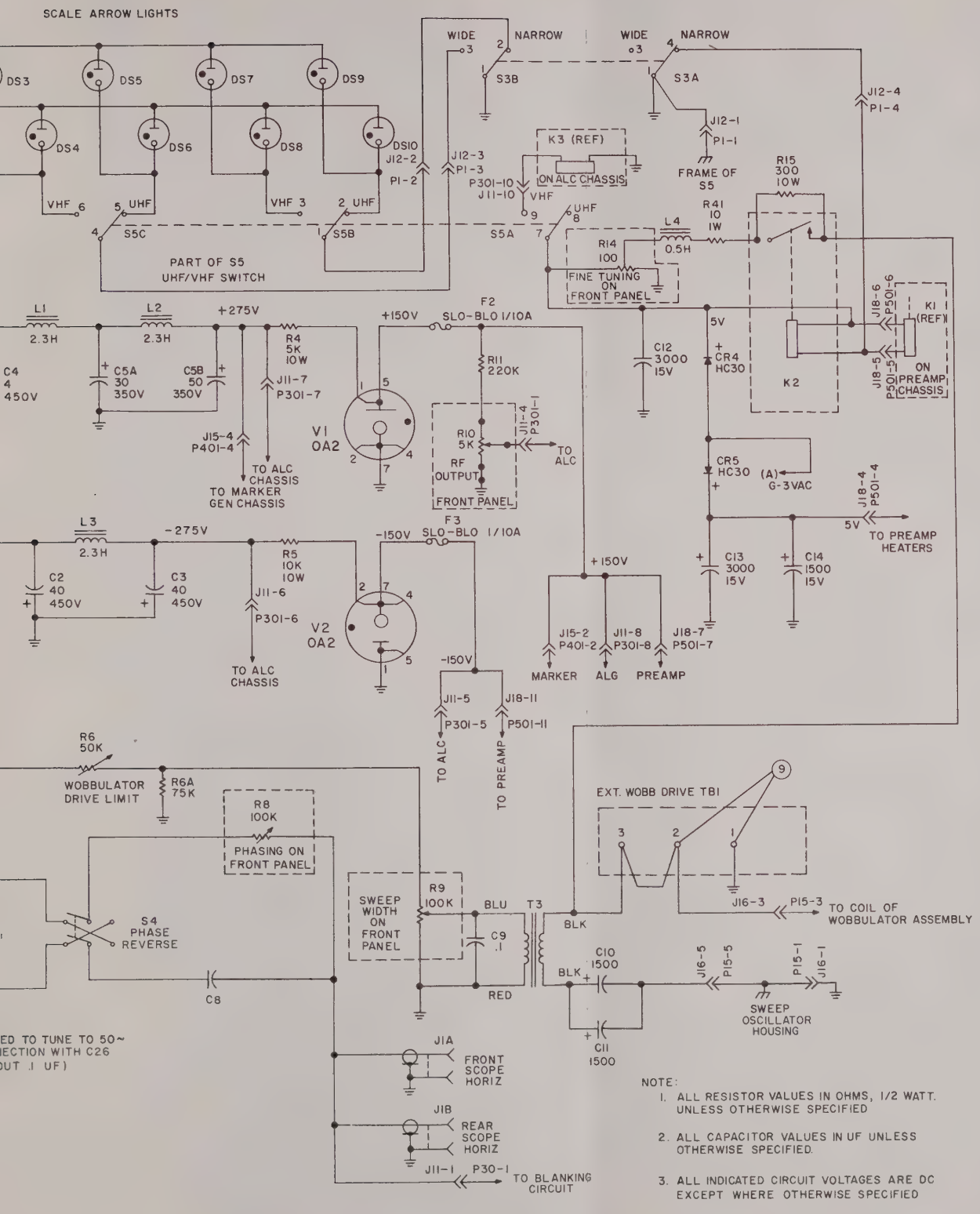
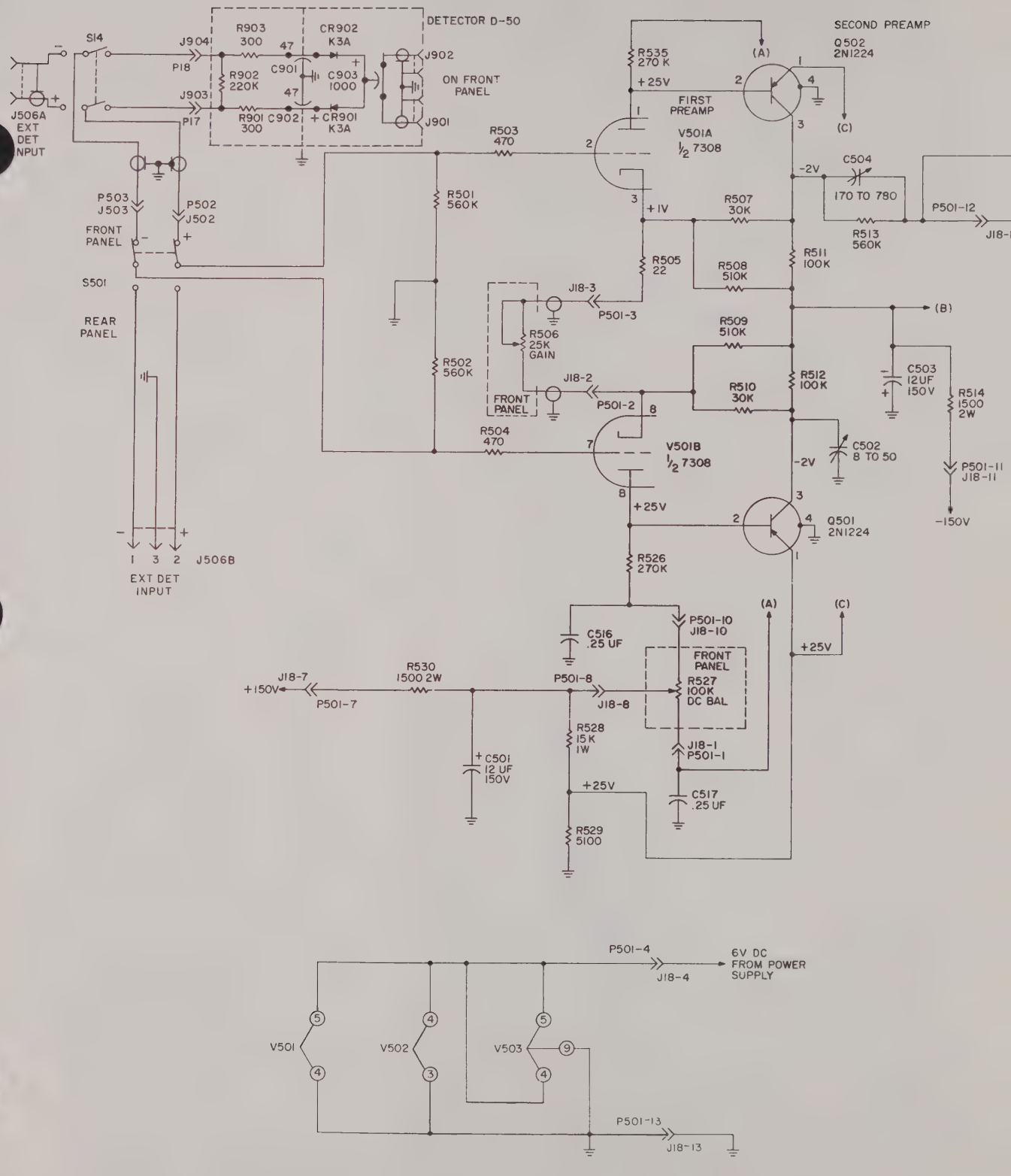
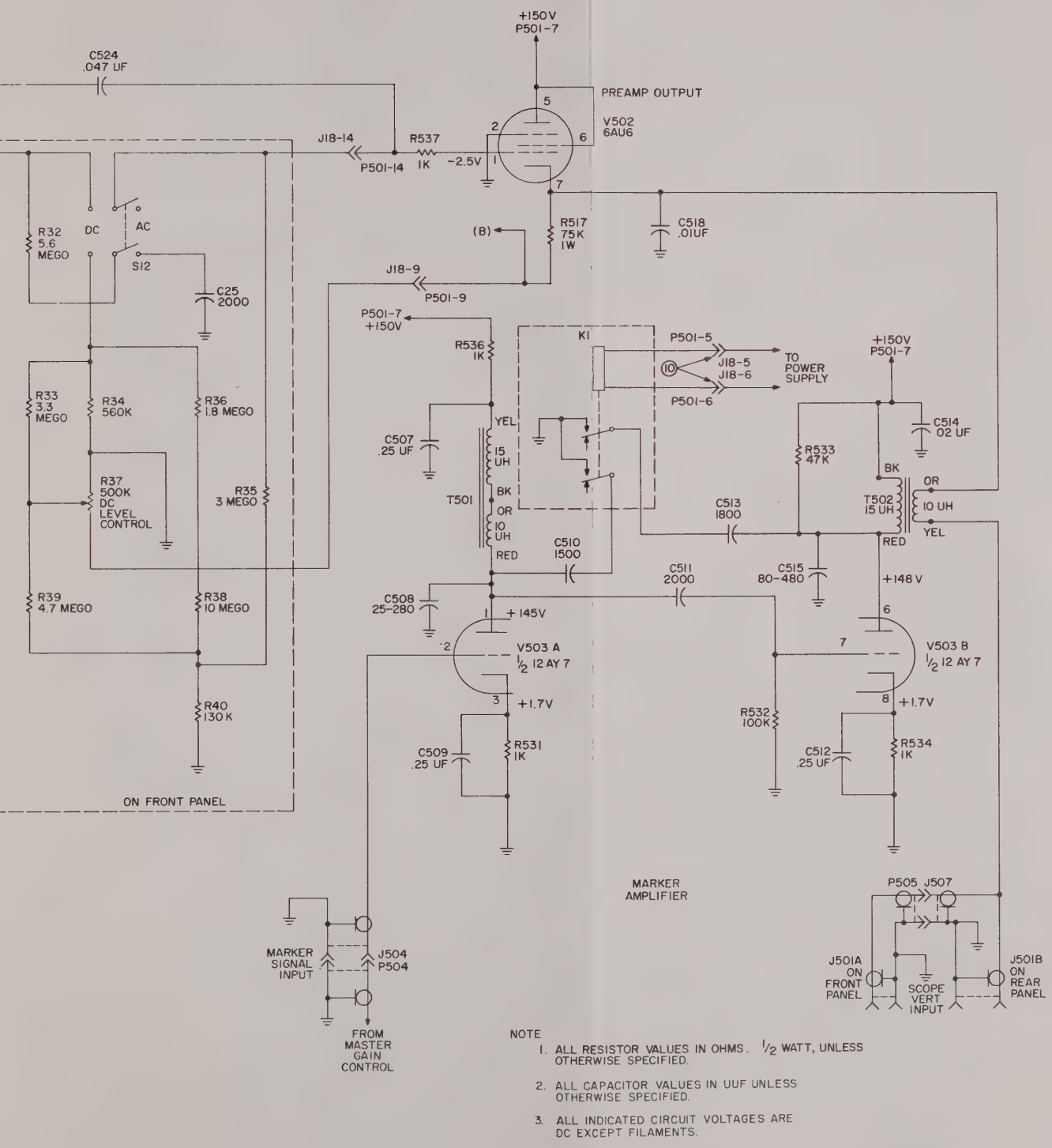


Figure 6-7. Power Supply Schematic

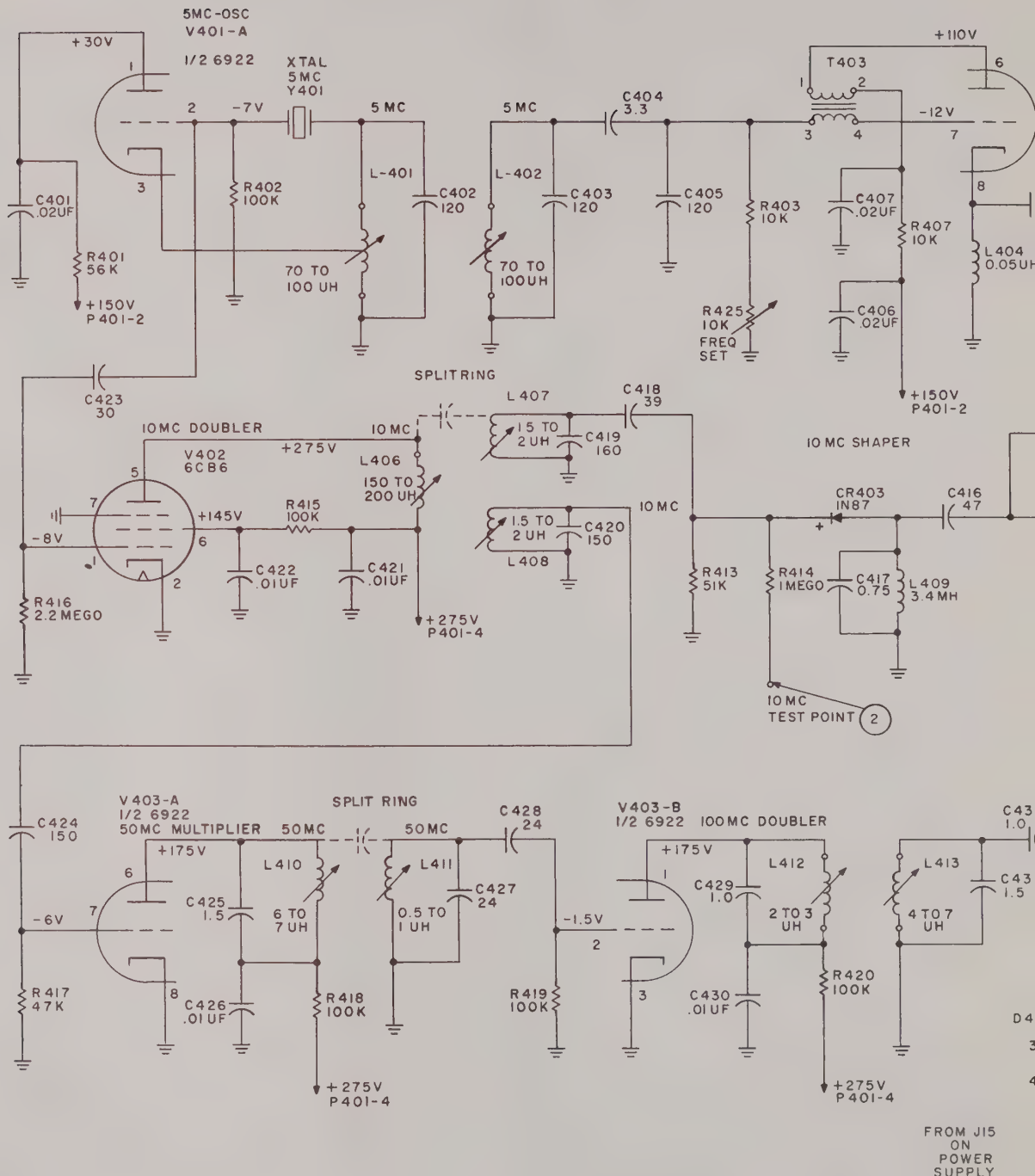

DETECTOR D-50
SECOND PREAMP
Q502
2N1224
S14
J904
P18
J903
P17
R903
300
47
CR902
K3A
R902
220K
C901
C903
1000
R901
300
C902
CR901
K3A
J902
J901
ON FRONT
PANEL
J506A
EXT
DET
INPUT
R535
270 K
+25V
(A)
(C)
FIRST
PREAMP
V501A
1/2 7308
R503
470
-2V
C504
170 TO 780
R513
560K
P501-12
R501
560K
+1V
R507
30K
P503
J503
P502
J502
FRONT
PANEL
S501
REAR
PANEL
R505
22
R508
510K
R511
100K
J18-3
P501-3
(B)
R509
510K
R506
25K
GAIN
R502
560K
J18-2
P501-2
R510
30K
R512
100K
C503
12UF
150V
R514
1500
2W
R504
470
V501B
1/2 7308
C502
8 TO 50
P501-11
J18-11
-150V
+25V
Q501
2N1224
R526
270K
J506B
EXT DET
INPUT
C516
.25 UF
P501-10
J18-10
FRONT
PANEL
R527
100K
DC BAL
J18-7
+150V
P501-7
R530
1500 2W
P501-8
J18-8
R528
15 K
1W
J18-1
P501-1
C501
12 UF
150V
+25V
C517
.25 UF
R529
5100
P501-4
J18-4
6V DC
FROM POWER
SUPPLY
V501
V502
V503
P501-13
J18-13

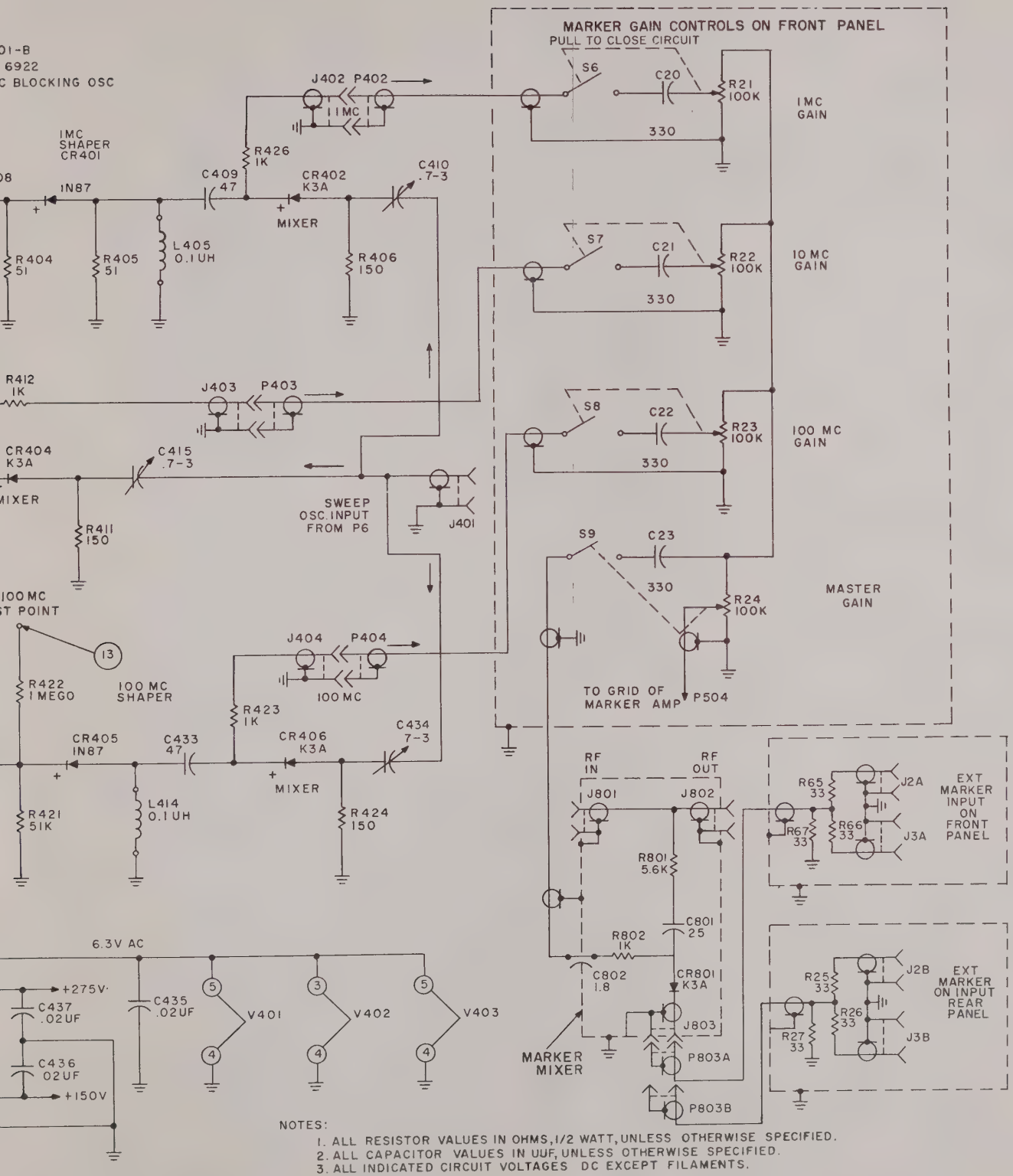


NOTE

1. ALL RESISTOR VALUES IN OHMS. 1/2 WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES IN UUF UNLESS OTHERWISE SPECIFIED.
3. ALL INDICATED CIRCUIT VOLTAGES ARE DC EXCEPT FILAMENTS.

Figure 6-8. Preamplifier and Marker Amplifier Schematic


5MC-OSC
V401-A
1/2 6922
+30V
XTAL
5MC
Y401
5 MC
-7V
C401
.02UF
R401
56K
+150V
P401-2
R402
100K
L-401
C402
120
70 TO
100 UH
5 MC
L-402
C403
120
70 TO
100UH
C404
3.3
C405
120
R403
10K
R425
10K
FREQ
SET
+110V
T403
-12V
C407
.02UF
R407
10K
L404
0.05UH
C406
.02UF
+150V
P401-2
C423
30
SPLIT RING
10MC DOUBLER
V402
6CB6
10 MC
+275V
L406
150 TO
200 UH
+145V
R415
100K
-8V
C422
.01UF
C421
.01UF
R416
2.2MEGO
+275V
P401-4
L 407
C418
39
1.5 TO
2 UH
C419
160
1.5 TO
2 UH
C420
150
L 408
10 MC SHAPER
10 MC
CR403
1N87
C416
47
R413
51K
R414
1MEGO
C417
0.75
L409
3.4MH
10 MC
TEST POINT
2
V403-A
1/2 6922
50MC MULTIPLIER
SPLIT RING
50MC
50MC
C428
24
+175V
L410
L411
C424
150
C425
1.5
6 TO
7 UH
0.5 TO
1 UH
C427
24
-6V
R417
47K
C426
.01UF
R418
100K
+275V
P401-4
-1.5V
R419
100K
V403-B
1/2 6922
100MC DOUBLER
+175V
L412
C429
1.0
2 TO 3
UH
C430
.01UF
R420
100K
+275V
P401-4
L413
4 TO 7
UH
C43
1.0
C43
1.5
FROM J15
ON
POWER
SUPPLY



NOTES:
1. ALL RESISTOR VALUES IN OHMS, 1/2 WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES IN UUF, UNLESS OTHERWISE SPECIFIED.
3. ALL INDICATED CIRCUIT VOLTAGES DC EXCEPT FILAMENTS.

Figure 6-9. Harmonic Marker Generator Schematic

SECTION VII

CALIBRATION

7-1. FREQUENCY OF CALIBRATION.

7-2. Calibration of the sweep generator is not based on definite elapsed time periods or hours of use. Calibration of sections of the sweep generator is necessary only after replacement of defective components or when a periodic inspection reveals changes in calibration sufficient to cause errors.

7-3. CALIBRATION EQUIPMENT.

7-4. Refer to figure 7-1 for equipment recommended for calibrating the Model 1974 Sweep Signal Generator.

7-5. CALIBRATION.

7-6. CALIBRATION OF MIXER AND VHF-ALC DETECTOR. Calibrate the mixer and VHF-ALC detector as follows. (Refer to figure 7-2.)

a. Disconnect the sweep generator from the supply line receptacle.

b. Remove side cover and top cover from the mixer chassis, figure 4-6.

c. Remove resistors R702 and R703 (A, figure 7-2) using as little heat as possible. Replace each resistor removed with a small 250-ohm variable resistor. Keep the connecting leads as short as possible.

d. Connect RF OUTPUT jack J4 to the DETECTOR jack J902, as described in paragraph 4-8, step g. Terminate DETECTOR jack J901 with part number TR-53 termination, figure 3-2.

e. Connect the sweep generator to an oscilloscope and to the supply line receptacle. Turn both units on for a 30-minute warmup period.

f. Set BAND SELECTOR switch S5 to VHF position.

g. Set SWEEP WIDTH switch S3 to WIDE position.

h. Set FREQUENCY MEGACYCLES dial to 225 mc on the scale indicated by lighted arrows.

i. Adjust SWEEP WIDTH control R9 to sweep the entire VHF frequency range of 0 to 450 mc.

j. Push BLANKING switch S10 to the IN position, adjust PHASING control R8 for proper phasing, and pull BLANKING switch S10 to the OUT position.

k. Pull 10 MC MARKER GAIN control S7, R22 and 100 MC MARKER GAIN control S8, R23 to the OUT position, and adjust markers for satisfactory visibility and identification.

l. Use the above markers to ascertain that the entire VHF range is being swept.

Nomenclature	Part No. or Model	Application	Range	Accuracy
Oscilloscope	Hewlett-Packard Model 130B	Obsevation of sweep generator output voltage	0 to 300 kc bandwidth 1 mv per cm to 125v per cm horizontal and vertical amplifier output	± 5 percent
RF Voltmeter	Hewlett-Packard Model 411A	Calibration of VOLTS meter and sweep oscillator	500 kc to 1000 mc 3 mv to 10 v	± 6 percent ± 3 percent
Voltohmyst	RCA type WV-77E	Measurement of circuit voltages and resistances	0 to 1500 v 0 to 1000 megohms	± 3 percent ± 3 percent
Milliameter	Simpson type 125	Measurement of tube V201 cathode current	0 to 100 ma	± 2 percent

Figure 7-1. Test Equipment Required for Calibration.

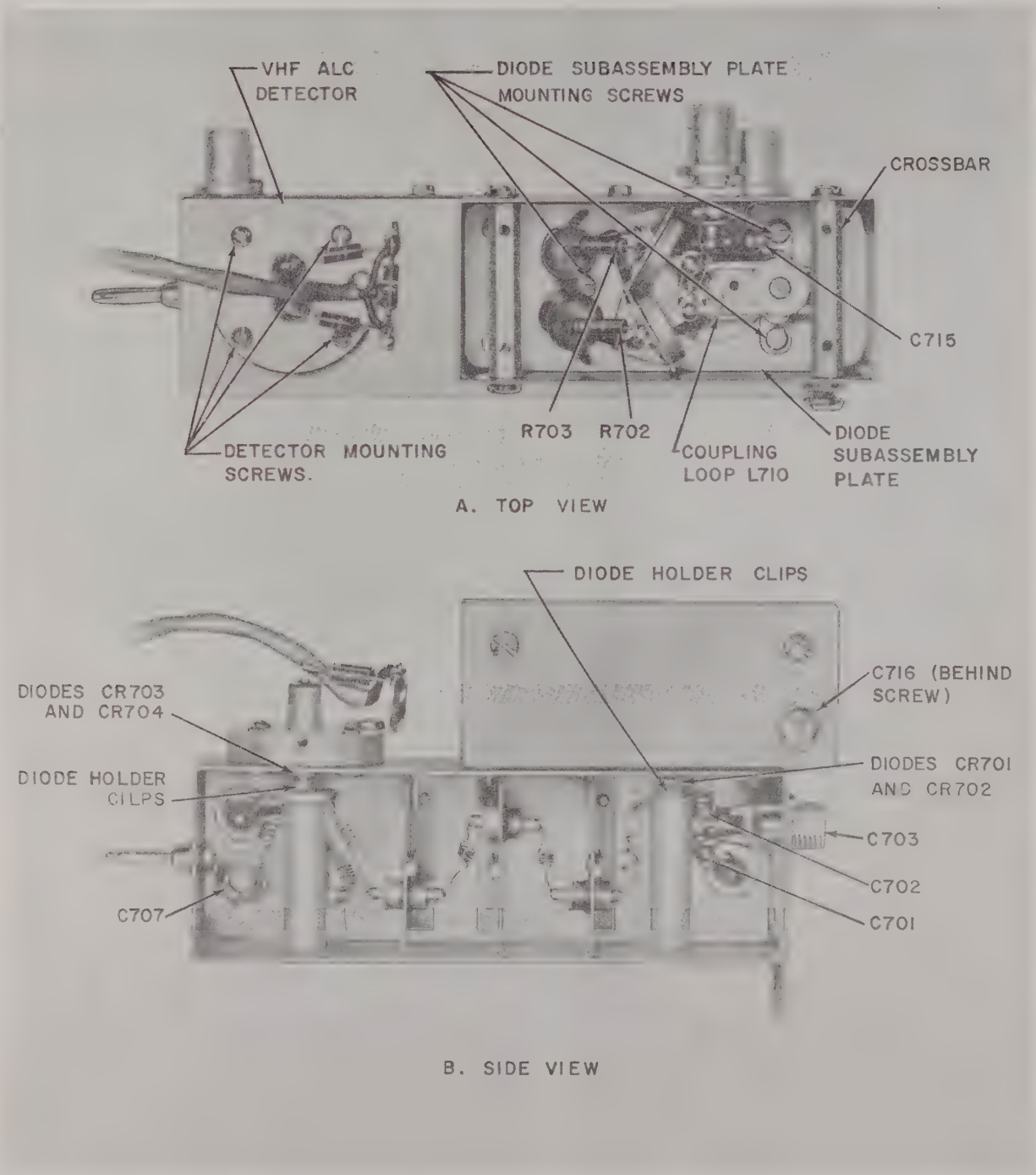


Figure 7-2. Mixer and VHF-ALC Detector

m. Adjust RF OUTPUT control R10 to extreme clockwise position, to remove ALC effects.

n. Adjust the variable resistors installed in step c to get a response curve display on the oscilloscope screen as high in amplitude and as flat as possible. If the maximum amplitude does not result in a flat top, reduce the amplitude until a reasonably flat presentation is obtained.

o. Adjust capacitors C701 and C702 (B, figure 7-2) alternately until the amplitude of the zero-beat (left-hand) end of the response curve display is as high as possible while still remaining reasonably flat.

p. Adjust capacitors C703 and C707 until the higher frequencies at the right-hand end of the response curve display just begin to cut off at 450 mc. This end of the response curve should be as flat as possible.

q. Push BLANKING switch S10 to the IN position.

r. Adjust coupling loop L710 (A, figure 7-2) to obtain 0.25 volt indication on the VHF scale of VOLTS meter M301.

s. Pull BLANKING switch S10 to the OUT position without disturbing the setting of PHASING control R8.

t. Adjust capacitor C716 for maximum amplitude of the response curve display. If two maximum points are found, leave the adjustment at the center of the two maximums.

u. Adjust capacitor C715 to resonance as indicated by an increase in amplitude of the response curve. Back off this adjustment slightly, until the amplitude is not affected.

v. Adjust RF OUTPUT control R10 counterclockwise until the response curve display flattens to a straight line, indicating that the ALC circuitry is operating.

w. Push 10 MC and 100 MC MARKER GAIN controls S7, S8 to the IN position to remove the marker signals from the oscilloscope display.

x. Examine the response curve display for tiny markers. (Turn up the vertical amplifier gain on the oscilloscope as high as possible for this operation.) These markers represent extraneous beat frequency components in the output of the mixer.

y. Adjust the variable resistors installed in step c to reduce the amplitude of these extraneous beats to a minimum. This is a very slight adjustment; do not vary these adjustments more than a few degrees.

z. Disconnect the sweep generator from the power line receptacle.

aa. Carefully unsolder one end of each variable resistor added in step c. Measure the resistance setting of each and record the value and its respective position in the circuit.

ab. Remove the two variable resistors and replace with 1/2-watt Allen-Bradley type EB resistors, or equivalent, having the same resistance values measured in step aa.

ac. Replace the covers removed in step b, and reapply power to the sweep generator.

ad. Cross check items in steps l, m, n, v, and x to see that no significant changes have occurred. If any of the items have changed appreciably, repeat the entire procedure, using greater care in making the adjustments.

NOTE

The adjustment of L710 and C715 in step r and u will change the adjustment of the VHF fixed oscillator. Refer to the procedure in paragraph 7-7 to realign the VHF fixed oscillator.

7-7. CALIBRATION OF VHF FIXED OSCILLATOR. Calibrate the VHF fixed oscillator as follows. (Refer to figure 7-3.)

a. Leave the controls and equipment in the same position as described in paragraph 7-6.

b. Disconnect the red-white B+ lead from filter FL202 and insert a 100 milliampere d-c meter between this lead and the filter. Connect the positive (+) terminal of the meter to the red-white wire, and the negative (-) terminal to the filter.

c. Apply power to the sweep generator and observe the pointer deflection of the meter installed in step b. Adjust the CATHODE TUNING adjustment C201 for minimum meter indications.

CAUTION

This adjustment should be made immediately after power is applied. Have a screwdriver in position on C201 before applying power. Failure to do this could damage tube V201.

d. Adjust the FREQUENCY MEGACYCLES dial to move the VHF zero beat marker to the center of the oscilloscope screen.

e. Pull the 100 MC MARKER GAIN control S8, R23 to the OUT position and rotate it for visible 100 mc markers on the oscilloscope screen.

f. Set SWEEP WIDTH switch S3 to the WIDE position, and adjust SWEEP WIDTH control R9 to produce a 3-mc sweep width.

g. Push BLANKING switch S10 to the IN position, rotate PHASING control R8 for proper phasing, and pull BLANKING switch to the OUT position.

h. Adjust FIXED OSC FREQ control C205, on the front panel, to check that the VHF zero beat marker can be moved approximaely 3 mc on the oscilloscope screen. Leave the zero beat marker at the left-hand edge of the screen.

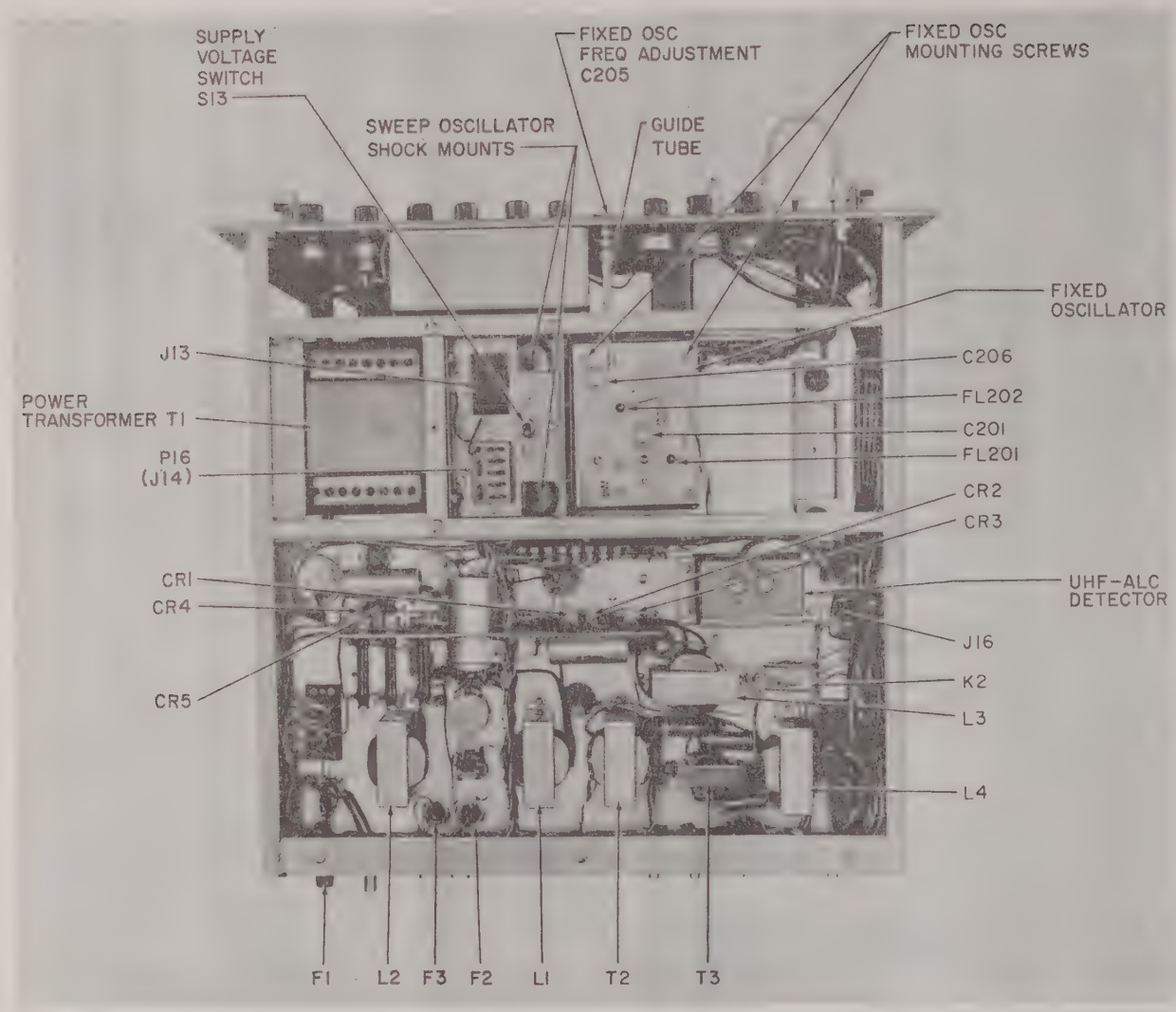


Figure 7-3. Bottom View of Sweep Generator

i. Adjust PLATE TUNING capacitor C206 (figure 7-3) until the VHF zero beat marker and the 600 mc marker coincide.

NOTE

When the two markers are in exact coincidence, a ripple will occur on the straight portion of the oscilloscope pattern due to beat frequency interference. Adjust the PLATE TUNING capacitor C206 slightly until the ripples disappear.

j. Adjust CATHODE TUNING capacitor C201 for minimum current indication on the external meter installed in step b above.

k. Repeat steps i and j until both conditions are met.

l. Observe the current indication on the external meter installed in step b. It should indicate between 8 and 12 milliamperes.

m. Disconnect operating power and remove the external meter. Reconnect the red-white wire to filter FL202.

7-8. CALIBRATION OF THE VOLTS METER. The VOLTS meter M301 will require recalibration each time adjustments or component replacements are made in various parts of the sweep generator, particularly in the RF circuits, the ALC amplifier and the meter amplifier. Calibrate the VOLTS meter as follows. (Refer to figure 7-4.)

a. Set BAND SELECTOR switch S5 to the VHF position.

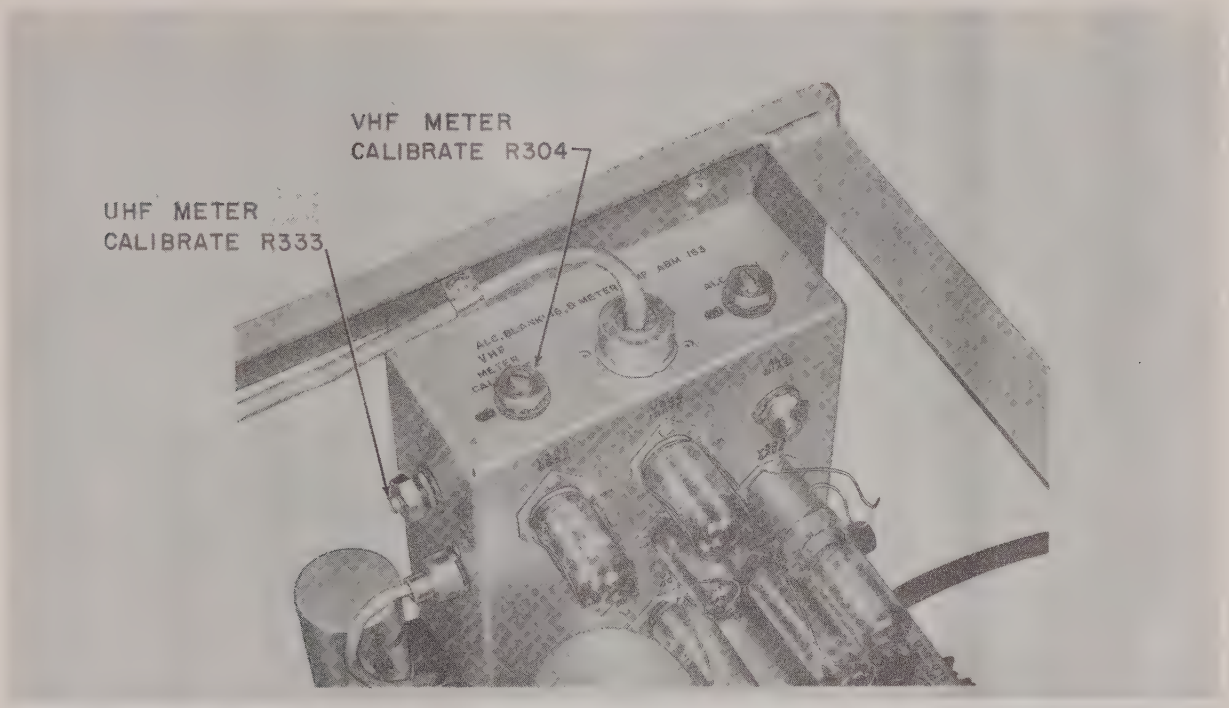


Figure 7-4. Meter Amplifier Adjustments

b. Set ATTENUATOR db control AT1 to 0.

c. Set FREQUENCY MEGACYCLES dial to 50 mc.

d. Adjust SWEEP WIDTH switch S3 and SWEEP WIDTH control R9 for a 1-mc sweep width.

e. Adjust PHASING control R8 for proper phasing.

f. Leave BLANKING switch S10 in the IN position. (Blanking must be off for proper meter calibration.)

g. Pull PULL TURN FOR ZERO control S11, R28 to the OUT position, and rotate it until the meter pointer coincides with the left-hand end of the scales. Push the control knob in to the normal position.

h. Connect the input terminals of a Hewlett-Packard RF Voltmeter Model HP-411A, or equivalent, to the RF OUTPUT jack J4 of the sweep generator, using a short length of 50-ohm test cable.

i. Adjust RF OUTPUT control R10 until the HP-411A RF Voltmeter indicates 0.2 volt.

j. Vary the VHF METER CALIBRATE adjustment R304, located on the top edge of the ALC chassis, until the voltage indicated on the VHF scale of VOLTS meter M301 is exactly 0.2 volt.

k. Set BAND SELECTOR switch S5 to UHF position.

l. Set FREQUENCY MEGACYCLES dial to 400 mc.

m. Adjust SWEEP WIDTH switch S3 and SWEEP WIDTH control R9 for a 1-mc sweep width.

n. Adjust PHASING control R8 for proper phasing and leave BLANKING switch S10 in the IN position.

o. Adjust RF OUTPUT control R10 until the HP-411A RF Voltmeter indicates 0.5 volt.

p. Adjust UHF METER CALIBRATE adjustment R333 until the voltage indicated on the UHF scale of VOLTS meter M301 is exactly 0.5 volt.

q. Disconnect the HP-411A RF Voltmeter.

7-9. ADJUSTMENT OF FEEDBACK TAB ON SWEEP OSCILLATOR. When sweep oscillator tube V601 has been replaced, the linearity of the output of the sweep oscillator must be restored. This is accomplished by adjusting the feedback tab C603 on the sweep oscillator. Perform the adjustment as follows. (Refer to figure 7-5.)

a. Connect RF OUTPUT jack J4 to one DETECTOR jack J902 on the front panel, and terminate the other DETECTOR jack J901 with the 50-ohm termination, part number TR-53.

b. Set BAND SELECTOR switch S5 to the UHF position.

c. Set SWEEP WIDTH switch S3 to the WIDE position.

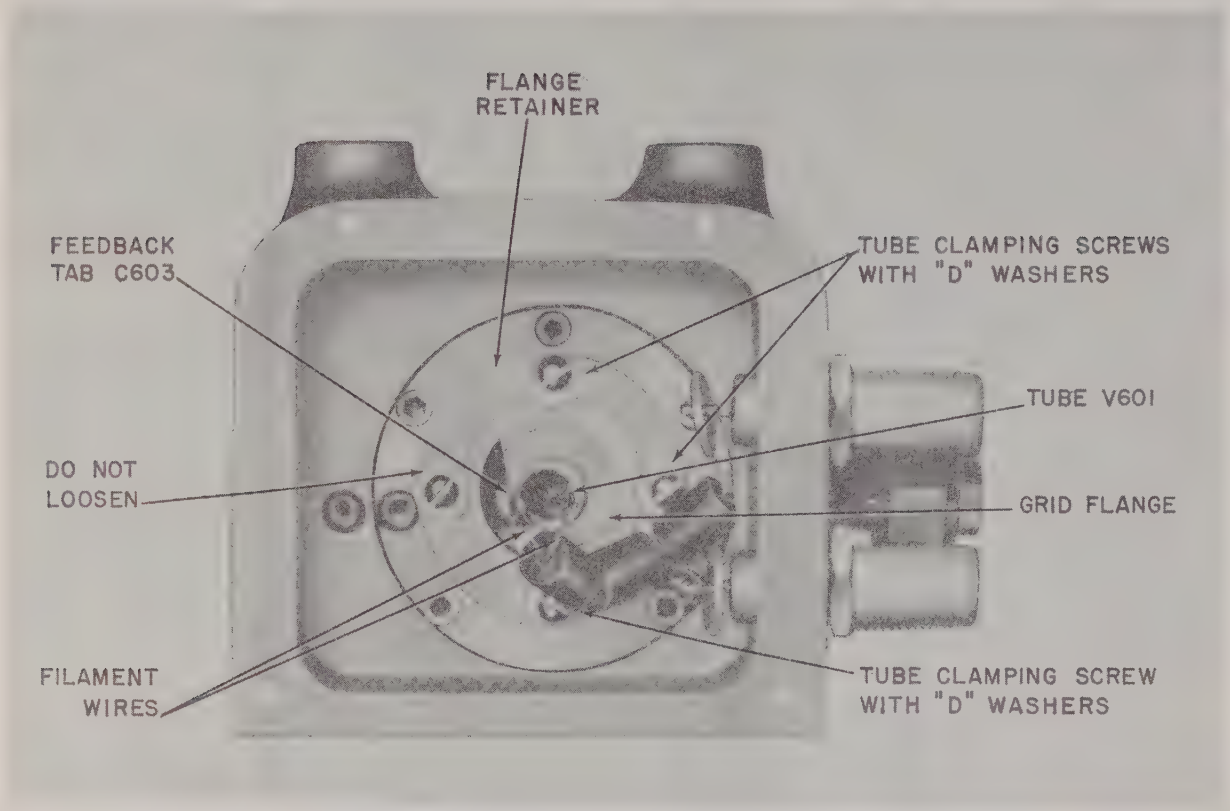


Figure 7-5. Sweep Oscillator with Tube (V601) in Place

d. Set SWEEP WIDTH control R9 to maximum clockwise position, or to the point just before the wobbulator assembly chatters. The sweep width at this point should be over 400 mc.

e. Set FREQUENCY MEGACYCLES dial to 1000 mc to display the 800 to 1200-mc portion of the UHF range.

f. Pull 100 MC MARKER GAIN control S8, R23 to OUT position and adjust markers for satisfactory visibility on the oscilloscope screen.

g. Remove the end cover from the sweep oscillator to expose feedback tab C603. This is a metallic tab soldered to the cathode sleeve of V601, which projects through the grid flange into the plate section of the sweep oscillator compartment.

h. Using a thin bakelite rod, push the tab closer to the plate of tube V601.

i. Observe the response curve display on the oscilloscope screen. The amplitude of the response curve will increase as feedback tab C603 is pushed toward the tube plate. Leave the feedback tab temporarily at the pont which produces the greatest amplitude.

j. Move the FREQUENCY MEGACYCLES dial to 475 mc to display the 275 to 675-mc portion of the UHF range.

k. Observe the display to see if the sweep oscillator stops oscillating at any point above 275 mc, or if the amplitude drops off appreciably at this end of the range compared to the 1200-mc end.

l. Adjust feedback tab C603 until the sweep oscillator oscillates freely and the amplitude is nearly the same over the entire frequency range from 275 to 1200 mc, favoring the 1200-mc end. When this adjustment has been completed, the UHF scale of VOLTS meter M301 should indicate a minimum of 0.5 volt over the entire UHF range, increasing slightly toward the 1200-mc end.

m. When the above condition has been met, reinstall the end cover on the sweep oscillator compartment.

n. Readjust VOLTS meter M301 as described in paragraph 7-8.

7-10. SWEEP OSCILLATOR.

7-11. Calibration should be limited to slight adjustments necessary to restore peak performance, and should be made only when performance has changed sufficiently to produce unsatisfactory operation.

7-12. Since the sweep generator is not intended to be used as an accurate frequency reference, slight deviations of the readings on the FREQUENCY MEGACYCLES dial will not affect its operation for frequency response analysis. As described in Section IV, Operation Instructions, all frequency measurements are made by highly accurate frequency markers derived from a crystal-controlled marker generator. However, the FREQUENCY MEGACYCLES dial is calibrated accurately when shipped from the manufacturer.

7-13. After the sweep generator has been in use for several thousand hours, the diaphragm of the wobbulator assembly begins to soften, allowing sweep frequency capacitor C601 to assume a slightly different position than when new. This causes a slight discrepancy in the FREQUENCY MEGACYCLES dial accuracy. This accuracy will also be affected by replacement of sweep oscillator tube V601, the adjustment of the feedback tab on this tube or the adjustment of any of the three output probes CP1, CP2 and CP3 on the sweep oscillator.

7-14. Slight errors in the accuracy of the FREQUENCY MEGACYCLES dial indications can be compensated by moving the dial cursor (4, figure 4-2), which has an adjustment of 1/4 inch each side of centerline. If the calibration errors are greater than can be compensated by the dial cursor, and a replacement sweep oscillator is not available, calibration of the sweep oscillator may be attempted as an emergency measure.

7-15. CALIBRATION OF THE SWEEP OSCILLATOR. Before beginning the actual calibration, the following preliminary action must be taken:

a. Remove the sweep oscilaator from the sweep generator, and mount it in the alignment jig (figure 7-6). Refer to repair instructions in Section VIII for removal and installation instructions.

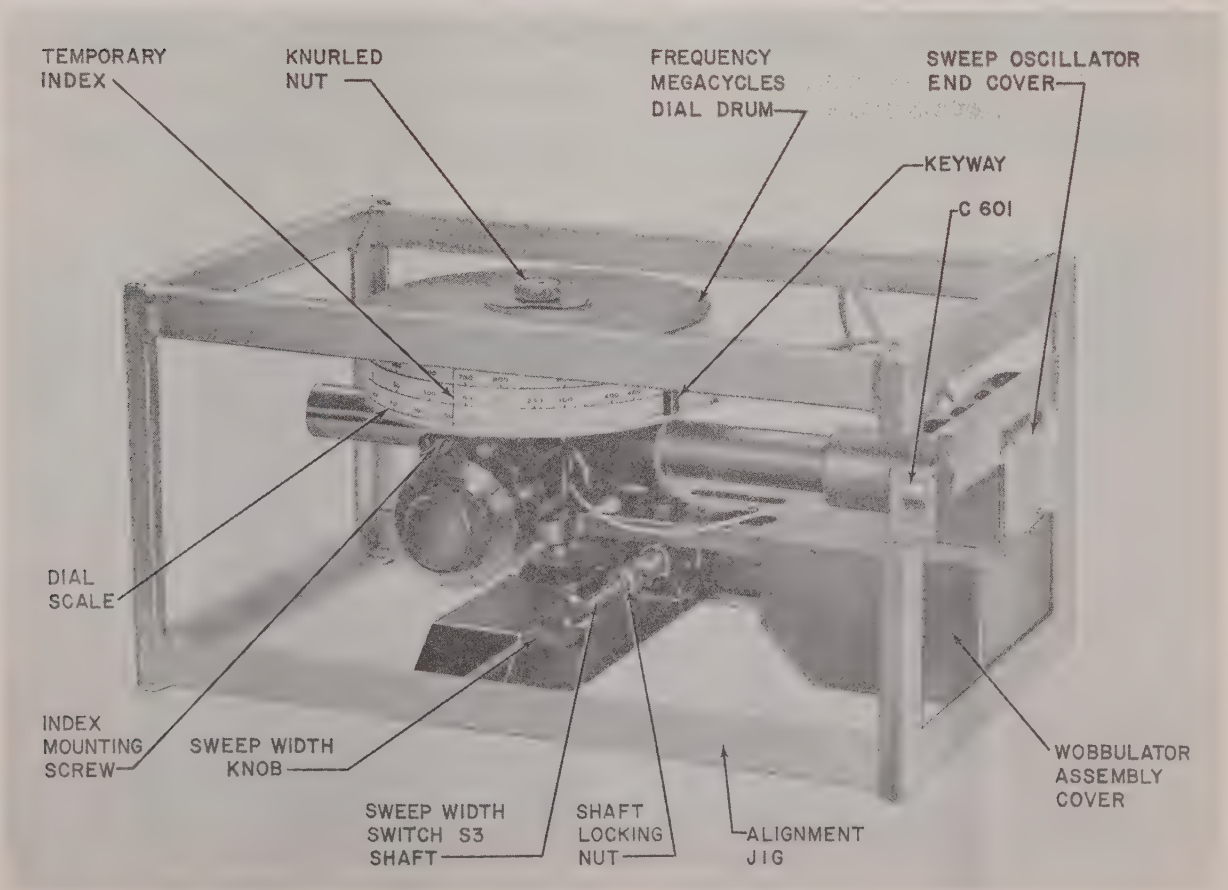


Figure 7-6. Sweep Oscillator Installed in Alignment Jig

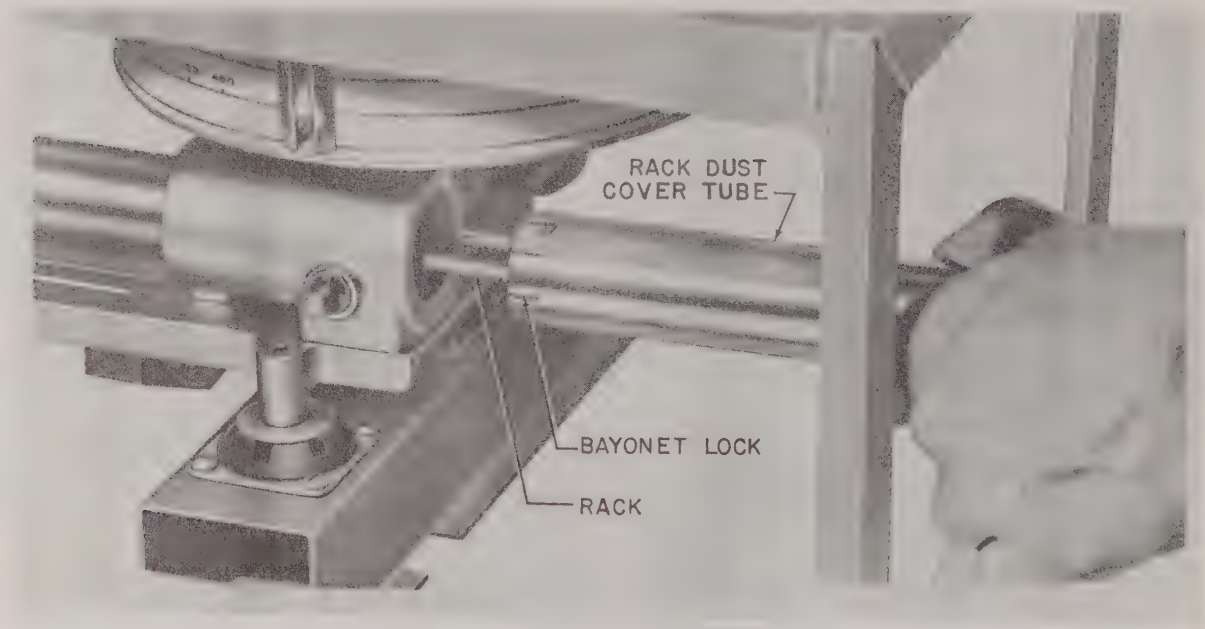


Figure 7-7. Removing Rack Dust Cover Tube

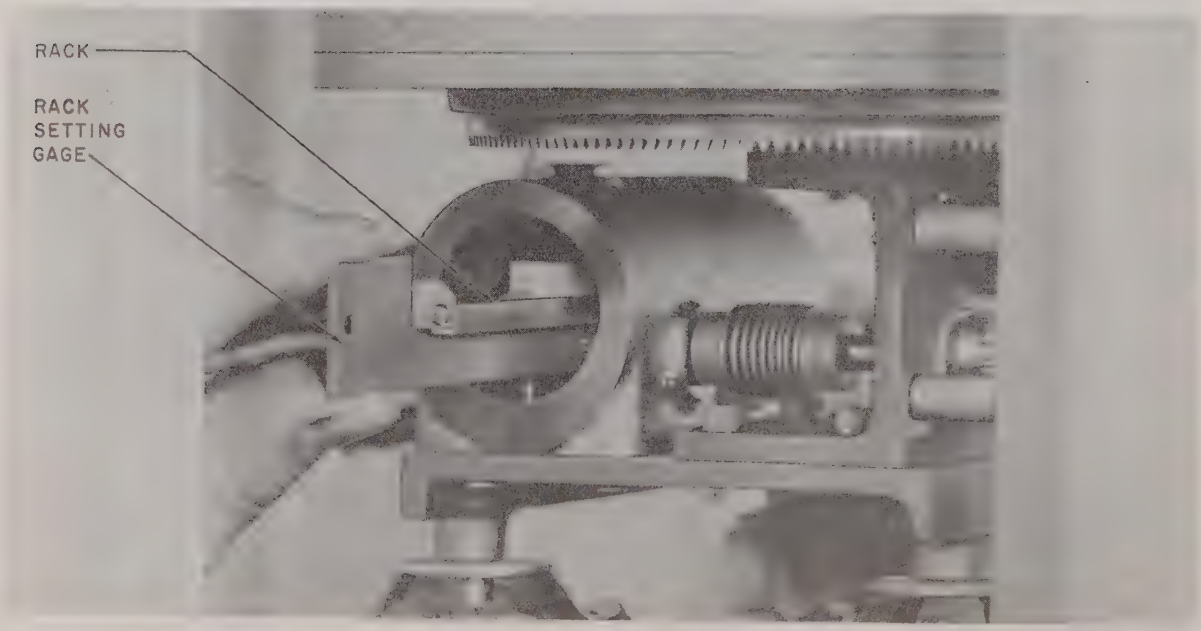


Figure 7-8. Setting Position of Rack with Rack Setting Gage

b. Connect the sweep generator to the oscilloscope and make the preliminary adjustments described in paragraph 7-6.

c. Adjust the sweep generator feedback tab C603, as described in paragraph 7-9.

7-16. PRELIMINARY ADJUSTMENT OF RF OUTPUT PROBE CP2.

a. Loosen the locknut on the probe (figure 4-6) with a 1/2-inch open-end wrench.

b. Disconnect red probe cable from BAND SELECTOR switch S5.

c. Screw the probe clockwise one complete turn, and reconnect the cable to switch S5.

d. Observe the oscilloscope pattern. Repeat steps b and c. The amplitude of the response curve will increase as the probe is screwed inward, and will begin to drop off at the 1200 mc-end (right-hand). The correct position of the probe is the point just before this dropoff condition is reached.

e. When the above condition has been met, tighten the locknut on the probe, being careful not to disturb the probe adjustment.

7-17. ADJUSTMENT OF ALC OUTPUT PROBE CP1.

a. Connect the sweep generator to the Hewlett-Packard HP-411A RF Voltmeter, as described in paragraph 7-8, steps a through g.

b. Operate the FREQUENCY MEGACYCLES dial over the entire UHF range. The HP-411A RF Voltmeter should indicate a minimum of 1 volt over this entire range.

c. If a 1 volt reading is not obtained in step b above, loosen the locknut on the ALC probe (figure 4-6) with a 1/2-inch open-end wrench.

d. Adjust the probe clockwise, until the HP-411A RF Voltmeter reads at least 1 volt over the UHF range. Do not adjust too far, since this adjustment will affect the calibration of the FREQUENCY MEGACYCLES dial.

e. Tighten the locknut on the ALC probe, being careful not to disturb the adjustment.

f. Disconnect the HP-411A RF Voltmeter.

7-18. ADJUSTMENT OF THE HARMONIC MARKER OUTPUT PROBE CP3.

a. With the oscilloscope still connected to the sweep generator, observe the 100 MC markers on the oscilloscope display. If the amplitude of the markers are satisfactory, do not readjust this probe.

b. If a harmonic marker probe (figure 4-6) has been replaced, or has been removed for any reason, screw the probe clockwise two or three full turns until the markers have sufficient amplitude for satisfactory viewing. Do not adjust the probe too far, since this adjustment will affect the calibration of the FREQUENCY MEGACYCLES dial.

7-19. FINAL ADJUSTMENT OF RF OUTPUT PROBE CP2.

a. Set SWEEP WIDTH switch S3 to the NARROW position.

b. Twist the rack dust cover tube (figure 7-7) counterclockwise to disengage the bayonet lock and ease it off the end of the rack.

c. Using the rack setting gage (figure 7-8), position the rack with the FREQUENCY MEGACYCLES knob.

d. If the 600-mc line (top scale) of the FREQUENCY MEGACYCLES dial coincides with the temporary index, proceed to step h. If not, perform steps e, f and g.

e. Loosen the setscrews on the dial drive gear (figure 7-9).

f. Rotate the frequency megacycles dial drum by hand until the 600-mc line on the top scale coincides with the temporary index.

g. Tighten the setscrews on the dial drive gear carefully, and recheck the adjustments described in steps c and d.

h. Adjust the FREQUENCY MEGACYCLES dial until the 600-mc marker appears at the center of the oscilloscope screen.

i. Adjust SWEEP WIDTH control R9 on the sweep generator until the above 600-mc marker is fully shown on the oscilloscope screen, to allow a more precise adjustment.

j. Observe the top scale of the FREQUENCY MEGACYCLES dial. If the 600-mc line coincides with the temporary index, proceed to step o. If not, perform steps k and l or m and n.

k. If the 600-mc marker is to the right of the temporary index, loosen the locknut on RF PROBE CP2 (figure 4-6) and screw it clockwise very slightly in 1/4-turn increments, not to exceed one full turn.

l. Adjust the ALC output probe as described in paragraph 7-17.

NOTE

The adjustments in steps k and l will interact with each other. Adjust the probes alternately until the conditions of step j, above, and paragraph 7-17, step b, have been met.

m. If the 600-mc line is to the left of the temporary index, loosen the locknut on RF PROBE CP2 and screw it counterclockwise very slightly in 1/4-turn increments, not to exceed one full turn.

n. Adjust the ALC output as described in paragraph 7-17, observing the NOTE following step l, above.

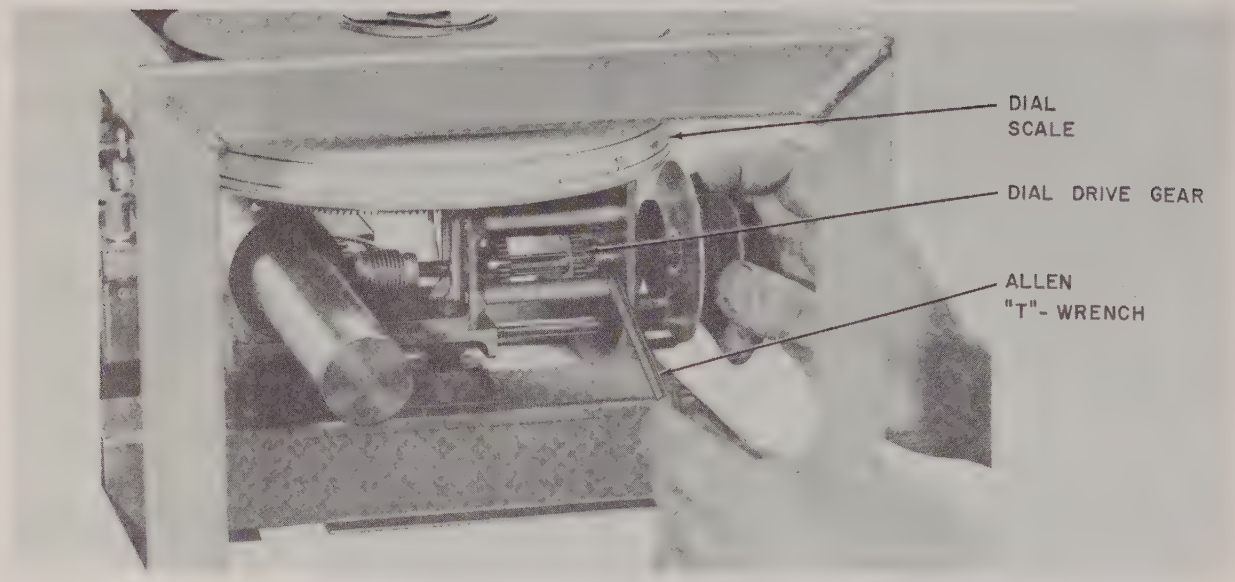


Figure 7-9. Loosening Set Screws to Adjust Dial

o. When all the above adjustments have been completed, tighten the probe locknuts securely, being careful not to disturb any of the adjustments.

p. Reinstall the rack dust cover tube removed in step b.

NOTE

Any of the above probe adjustments will affect the calibration of the VOLTS meter. When the entire calibration has been completed, recalibrate the VOLTS meter as described in paragraph 7-8.

7-20. ADJUSTMENT OF FREQUENCY MEGACYCLES DIAL TRACKING.

a. Set the FREQUENCY MEGACYCLES dial to 700 mc and check to see that the 700-mc line coincides with the 100-mc marker on the oscilloscope screen.

b. Check the positions at 800, 900, 1000, 1100, and 1200 mc in a similar manner. Note any deviations from exact coincidence.

c. Analyze the deviations to determine whether the entire dial scale has been compressed or expanded. If each 100-mc marker appears to the left-hand side of each 100-mc dial increment, the dial scale has been compressed. Conversely, if each 100-mc marker appears to the right-hand side of each 100-mc dial increment, the dial scale has been expanded. There are two factors, one electrical and the other mechanical, which can be adjusted to correct the deviations.

NOTE

If the deviations are the same at each frequency check point, this indicates a linear displacement of the dial scale. See steps j, k and l for correction.

d. Try to correct the deviation electrically first, by carefully adjusting RF output probe CP2 as described in paragraph 7-19, steps k through p. If the results are satisfactory, proceed to paragraph 7-21. If the deviation cannot be corrected with this adjustment, restore the original setting of the RF output probe and proceed to step e, for mechanical correction.

e. Loosen the set screws on the dial drive gear (figure 7-9).

f. Rotate the FREQUENCY MEGACYCLES dial drum one division above the 600-mc line if the dial scale has been compressed, or one division below the 600-mc line if the dial scale has been expanded (step c).

g. Tighten the setscrews on the dial drive gear.

h. Repeat the RF probe adjustment described in paragraph 7-19, steps k through p.

i. Repeat the dial tracking check, steps a, b and c, above.

j. To correct for linear displacement of the dial scale, loosen the knurled nut on top of the dial drum (figure 7-6). (Refer to NOTE in step c.)

k. Slide the dial scale in the proper direction to align the frequency indications. The amount of movement is limited by a keyway on the bottom half of the dial drum.

l. Tighten the knurled nut securely, being careful not to disturb the adjustment.

NOTE

If none of the above adjustments restores the proper dial tracking, suspect a defective or weak oscillator tube V601.

7-21. CALIBRATION OF THE VHF NARROW SWEEP SCALE. When the tracking adjustments in paragraph 7-20 have been completed, the VHF narrow width scale (bottom scale) will also track properly. There are no adjustments on this scale. If it does not track properly, and precise calibration is required, make up an external deviation table to be used with this scale. Use the following procedure:

a. Prepare a sheet of paper with two columns. Head one column "Indicated Megacycles" and the other column "MC Deviation."

b. Set up the sweep generator and oscilloscope as described in paragraph 4-7.

c. Set BAND SELECTOR switch S5 to VHF position.

d. Set SWEEP WIDTH switch S3 to NARROW position.

e. Set SWEEP WIDTH control R9 to maximum counterclockwise position. This produces zero sweep width, displaying only the center frequency on the oscilloscope screen.

f. Set up 1-mc markers on the oscilloscope screen.

g. Set the bottom scale of FREQUENCY MEGACYCLES dial to 1 mc, as accurately as possible. Note the dial reading on the scale engraved around the periphery of FREQUENCY MEGACYCLES knob (3, figure 4-2).

h. Enter this 1-mc dial reading in the first column of the prepared table (step a).

i. Rotate FREQUENCY MEGACYCLES knob in the direction which will make the 1-mc marker coincide exactly with the 1-mc center frequency on the oscilloscope display.

j. Count the number of dial divisions on FREQUENCY MEGACYCLES knob to obtain the condition in step i.

k. Multiply this number of dial divisions by 0.2 and enter the product in the second column of the prepared table (step a). Precede this entry with "+" if the required rotation was clockwise and with "-" if the rotation was counterclockwise.

l. Repeat the procedure in steps g through k for each dial increment marked on the bottom scale of the FREQUENCY MEGACYCLES dial.

7-22. CALIBRATION OF THE WIDE SWEEP SCALES. Check the UHF and VHF wide sweep scales (two center scales) against the 100 mc markers for proper frequency indication. If the error is not greater than 10 mc (1 scale division), no further adjustment is required. If the error is over 10 mc, the wobbulator assembly will require adjustment. Perform adjustment to wobbulator assembly as follows. (Refer to figure 7-10.)

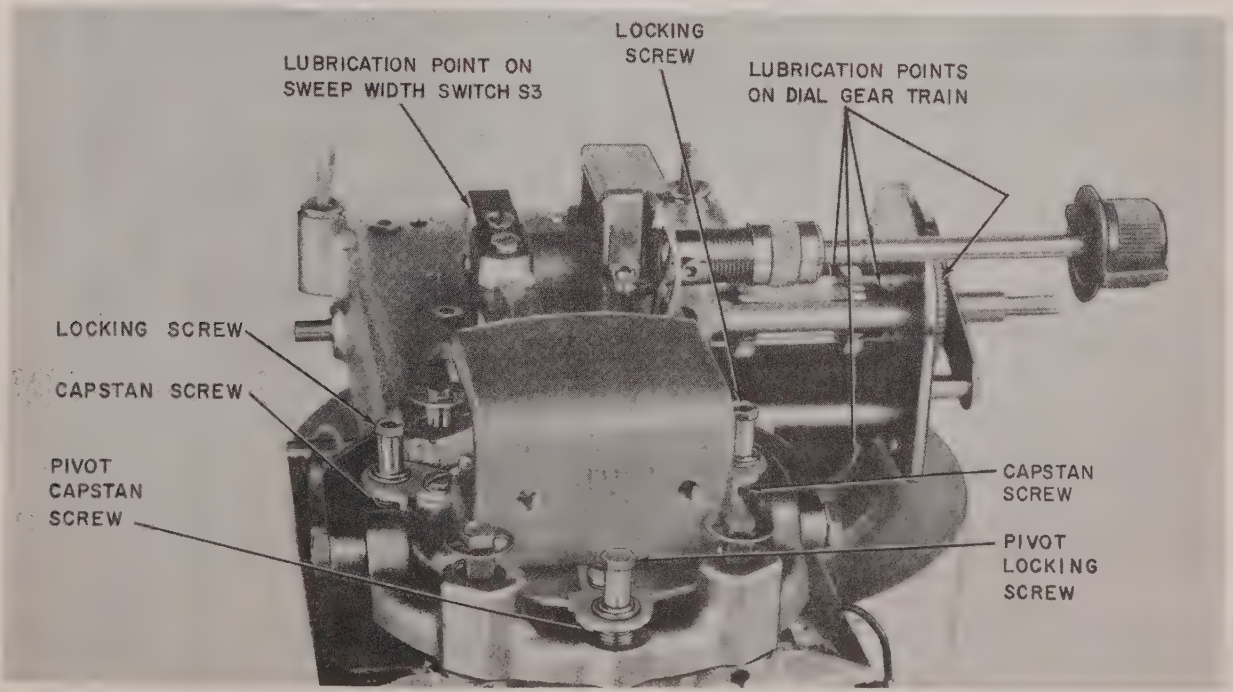


Figure 7-10. Adjustment of Wobbulator Assembly

NOTE

If the scale indication reads less than normal, the wobbulator assembly adjustment will be inward, requiring clockwise rotation of the capstan screws. In rare cases, where the scale indication reads more than normal, the adjustment will be outward, requiring counterclockwise rotation of the capstan screws.

a. Loosen one locking screw (figure 7-10) approximately one turn. Turn the loosened capstan screw 1/4-turn, and then tighten the locking screw. Repeat the procedure for the other two capstan screws.

b. Adjust SWEEP WIDTH control R9 for a 10-mc sweep width.

c. Loosen the locking nut on the pivot capstan screw very slightly.

d. Observe the 600-mc marker on the oscilloscope screen. Adjust the pivot capstan in the direction which moves the marker toward the left-hand edge of the screen. Continue this adjustment until the marker has moved as far as possible to the left and begins to reverse toward the right. The correct adjustment is the point where the marker is as far to the left as possible. Tighten the locking screw. This adjustment centers sweep capacitor C601 (figure 7-6) mounted on the wobbulator assembly.

NOTE

For clarity, C601 is shown in figure 7-6 with its compartment cover removed. This cover must be in place during calibration.

e. Recheck the dial scale calibration on the UHF wide scale to see what improvement has been made. If further adjustment is required, repeat steps a through d until the dial scale calibration is satisfactory.

7-23. Calibration of the sweep oscillator is now complete. Remove the sweep oscillator from the alignment jig. Install it into the sweep generator as described in Section VIII, paragraph 8-24.

SECTION VIII

REPAIR INSTRUCTIONS

8-1. GENERAL.

8-2. This section describes the special repair procedures necessary to remove certain critical subassemblies of the sweep generator. No part of the sweep generator should be removed until it has been definitely determined that trouble exists in that particular unit. Refer to troubleshooting, section VI, for detailed instructions on diagnosing malfunctions in the sweep generator.

CAUTION

Follow instructions carefully when removing components from the equipment. Do not use force! The components of the sweep generator are manufactured to very close tolerances and should be removed and installed with extreme care to avoid permanent damage to the equipment.

8-3. DIODES CR901 AND CR902 IN DETECTOR D-50.

8-4. REMOVAL OF CR901 AND CR902.

a. Remove two knurled screws (5, figure 8-1) to release the detector (4) from the front panel assembly (35).

b. Remove detector panel from the detector (figure 8-2).

c. Remove diodes from the diode cavities, noting the polarity.

d. Refer to paragraph 6-12 for testing the diodes.

8-5. INSTALLATION OF CR901 AND CR902.

a. Insert the diodes in the holder clips (figure 8-2), which are affixed to the panel. Be certain that the polarity of diodes is correct.

b. Install the panel carefully on the detector, observing that the diodes enter their respective cavities.

c. When the diodes have reached the end of their cavities, a slight resistance will be felt. This is the tension of the spring clips at the end of the cavity. Push firmly until both crystals enter their spring clips. The detector panel should now be flush with the case of the detector.

d. Install the detector (4, figure 8-1) to the front panel assembly (35) with two knurled screws (5).

8-6. DIODES CR101 AND CR102 IN UHF-ALC DETECTOR.

8-7. REMOVAL OF CR101 AND CR102.

a. Remove eight screws (7 and 8, figure 8-1) and remove the sweep generator from the cabinet (6).

b. Remove two wires from the bottom terminals of UHF-ALC detector (figure 7-3). Tag the color-coded leads with their destinations to facilitate reinstallation.

c. Remove four screws (76, figure 8-1) to release the detector (75) from the power supply (84).

d. Remove diodes CR101 and CR102 in the same manner as described in paragraph 8-4, steps b and c.

e. Refer to paragraph 6-12 for testing the diodes.

8-8. INSTALLATION OF CR101 AND CR102.

a. Install the diodes into the detector in the same manner as described in paragraph 8-5, steps a, b and c.

b. Install the detector (75, figure 8-1) into the power supply (84) with the four screws (76).

c. Solder the two wires to the bottom terminals of the UHF-ALC detector (figure 7-3). Utilize the tags attached to the leads to facilitate reinstallation (paragraph 8-7, step b).

d. Install sweep generator into the cabinet (6, figure 8-1) with eight screws (7) and (8).

8-9. DIODES CR701 AND CR702 IN MIXER.

8-10. REMOVAL OF CR701 AND CR702.

a. Remove the top cover of the mixer (figure 4-6).

b. Remove three mounting screws (A, figure 7-2) securing the diode subassembly plate.

c. Remove the crossbar.

d. Lift the coupling loop L710 (A, figure 7-2) up so it will not interfere with the removal of the diode subassembly plate.

e. Lift the diode subassembly plate straight up until the diodes are released from the spring clips. Note the polarity of the diodes. Maneuver the subassembly plate out of the mixer.

f. Refer to paragraph 6-12 for testing the diodes.

8-11. INSTALLATION OF CR701 AND CR702.

a. Install the diodes into holder clips in the mixer (figure 7-2). Be certain that the polarity of the diodes is correct.

b. Install the diode subassembly plate to the mixer, guiding the holder clips of the plate onto the diodes.

c. Install the crossbar (A, figure 7-2) onto the mixer.

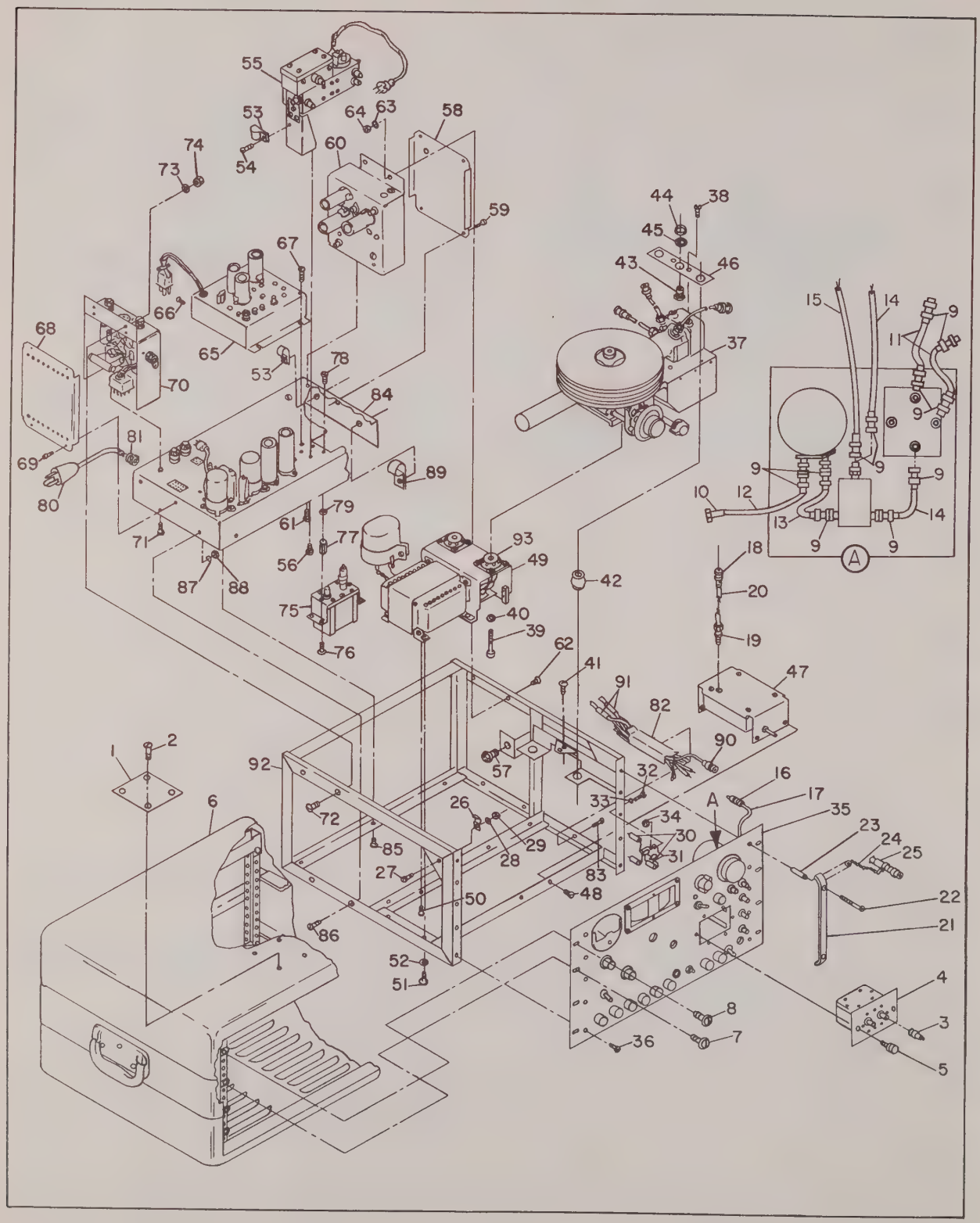


Figure 8-1. Sweep Generator, Exploded View

1. Identification Plate
2. Screw
3. Termination Part Number TR-53
4. Detector, Model D-50
5. Thumbscrew
6. Cabinet
7. Screw
8. Screw
9. Cable End Connectors
10. Cable End Connector
11. RF Cable Assembly
12. RF Cable Assembly
13. RF Cable Assembly
14. RF Cable Assembly
15. RF Cable Assembly
16. Plug P803B
17. RF Cable
18. Probe and Cable Assembly
19. Probe and Cable Assembly
20. Probe and Cable Assembly
21. Handle
22. Screw
23. Sleeve Spacer
24. Bead Chain
25. Attenuator AT3
26. Retaining Strap
27. Screw
28. Lockwasher
29. Nut
30. Resistor
31. Terminal Board
32. Screw
33. Lockwasher
34. Nut
35. Front Panel
36. Screw
37. Sweep Oscillator
38. Cap Screw
39. Cap Screw
40. Washer
41. Cap Screw
42. Shock Mount
43. Bushing
44. Nut
45. Lockwasher
46. Shock Mount Plate
47. Fixed Oscillator
48. Screw
49. Transformer Assembly
50. Screw
51. Screw
52. Washer
53. Clamp
54. Screw
55. Mixer
56. Screw
57. Mixer Grounding Jack
58. Preamplifier Bottom Plate
59. Screw
60. Preamplifier
61. Screw
62. Screw
63. Lockwasher
64. Nut
65. Harmonic Marker Generator
66. Screw
67. Screw
68. ALC Chassis Bottom Plate
69. Screw
70. ALC Blanking and Meter Amplifier
71. Screw
72. Screw
73. Lockwasher
74. Nut
75. UHF-ALC Detector
76. Screw
77. Nut
78. Screw
79. Lockwasher
80. Power Cable Assembly
81. Bushing
82. Cable Protector
83. Screw
84. Power Supply
85. Screw
86. Screw
87. Lockwasher
88. Nut
89. Clamp
90. UG-88/U Connector
91. Plug P502, P503
92. Mounting Frame
93. Sweep Oscillator Shock Mounts

Figure 8-1. Sweep Generator, Exploded View - Legend

d. Place the coupling loop L710 (A, figure 7-2) back in position.

e. Adjust the mixer as described in paragraph 7-6.

8-12. DIODES CR703 AND CR704 IN VHF-ALC DETECTOR.

8-13. REMOVAL OF CR703 AND CR704.

a. Remove four screws (A, figure 7-2) attaching the VHF-ALC detector (A, figure 7-2) to the mixer. Then gently pry the detector plate from the mixer.

b. Remove the diodes from the holder clips. Note the polarity of the diodes.

c. Refer to paragraph 6-12 for testing the diodes.

8-14. INSTALLATION OF CR703 AND CR704.

a. Install the diodes into holder clips in the mixer (figure 7-2). Be certain that the polarity of the diodes is correct.

b. Install the VHF-ALC Detector to the mixer, guiding the holder clips of the detector into the diodes.

c. Adjust capacitor C707 as described in paragraph 7-6, step p.

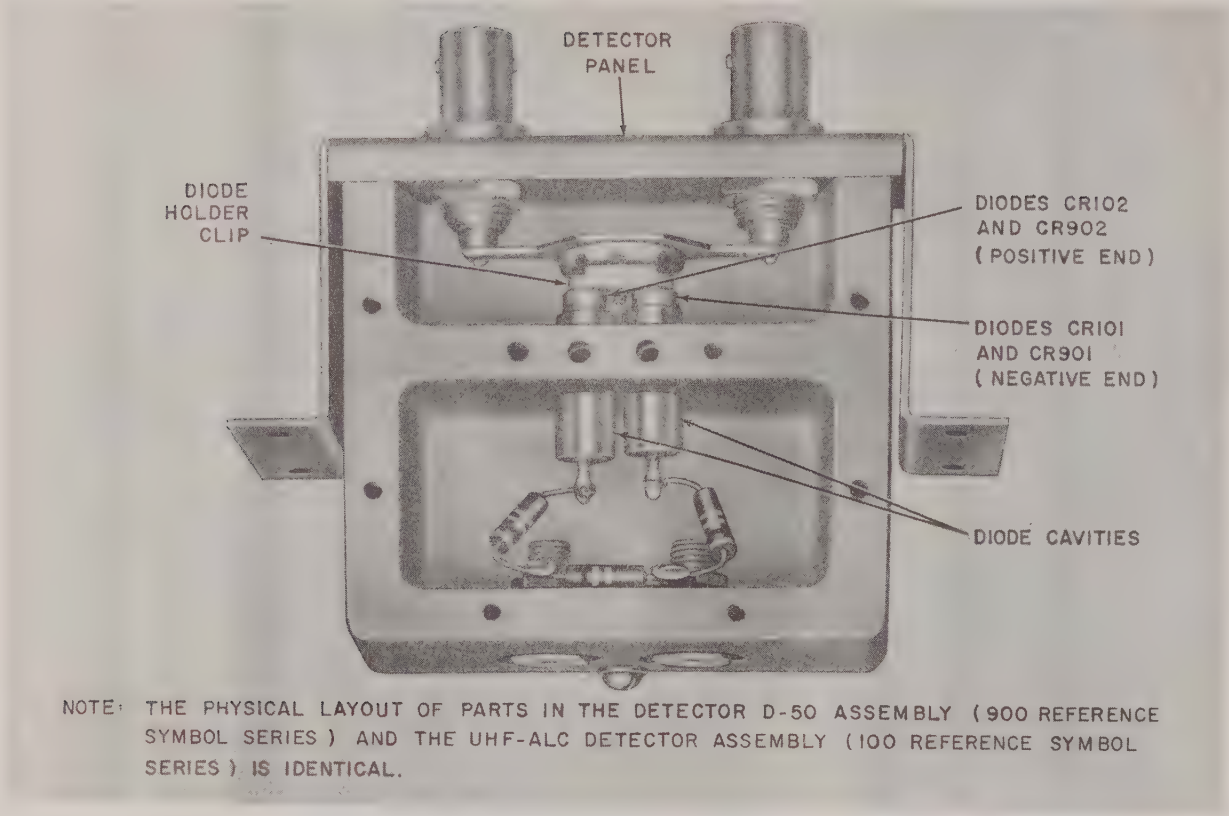

DETECTOR PANEL
DIODE HOLDER CLIP
DIODES CR102 AND CR902 (POSITIVE END)
DIODES CR101 AND CR901 (NEGATIVE END)
DIODE CAVITIES
NOTE: THE PHYSICAL LAYOUT OF PARTS IN THE DETECTOR D-50 ASSEMBLY (900 REFERENCE SYMBOL SERIES) AND THE UHF-ALC DETECTOR ASSEMBLY (100 REFERENCE SYMBOL SERIES) IS IDENTICAL.

Figure 8-2. Interior View of Detector D-50 and UHF-ALC Detectors

8-15. RF OSCILLATOR TUBES.

8-16. The RF oscillator tubes V201 and V601 should not be replaced unless tests described in troubleshooting, Section VI, have been made to determine that replacement is necessary.

8-17. REMOVAL OF FIXED OSCILLATOR TUBE V201.

a. Remove eight screws (7 and 8, figure 8-1) and remove the sweep generator from the cabinet (6).

b. Remove the four mounting screws to release the fixed oscillator from the sweep generator (figure 7-3).

c. Slide the guide tube off the shaft of capacitor C205 toward the front panel.

d. Grasp tube V201 (figure 8-3) and pull it up gently until it is free from the spring clips holding it to the tuning assemblies.

e. Carefully pull the filament socket from the end of the tube.

8-18. INSTALLATION OF FIXED OSCILLATOR TUBE V201.

a. Insert the filament pins of the tube into the filament socket (figure 8-3).

b. Insert the tube carefully into the spring clips. Make certain that the grid flange is aligned with the grid spring clip, and push the tube firmly into position. Be sure that all three spring clips are making good contact with the tube.

c. Install the fixed oscillator into the sweep generator with the four mounting screws (figure 7-3).

d. Adjust the fixed oscillator tuning as described in paragraph 7-7.

CAUTION

Damage to tube V201 can occur unless adjustments described in paragraph 7-7 are made before power is applied to the sweep generator.

e. Install the sweep generator into the cabinet (6, figure 8-1) with eight screws (7) and (8).

8-19. REMOVAL OF SWEEP OSCILLATOR TUBE V601.

a. Remove eight screws (7 and 8, figure 8-1) and remove the sweep generator from the cabinet (6).

b. Remove four screws to release the end cover (figure 7-6 from the sweep oscillator.

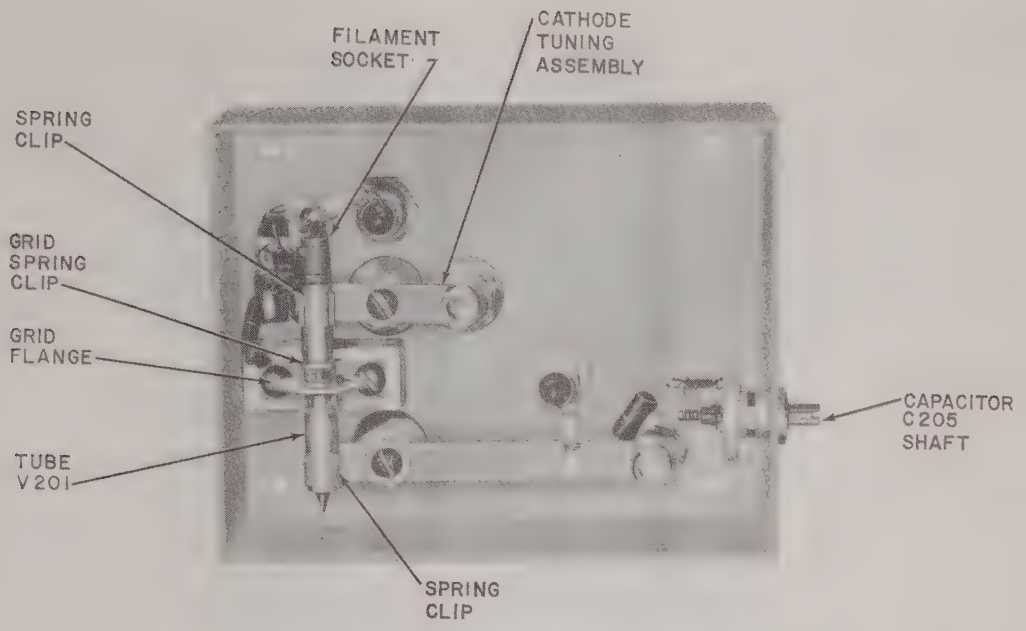


Figure 8-3. Bottom View of Fixed Oscillator

c. With a small soldering iron, quickly unsolder the wires from the filament and cathode of tube V601 (figure 7-5), noting the color code of the wires. Do not apply heat to the parts too long.

d. Loosen the three screws with "D" washers that clamp the grid flange of the tube to the flange retainer.

NOTE

One or two turns is sufficient; do not remove the screws entirely. Do not loosen the fourth screw which does not have a "D" washer.

e. Turn the "D" washers so that the flat sides face the grid flange of the tube to allow the tube to be removed.

f. Gently withdraw the tube straight out by grasping the cathode.

8-20. INSTALLATION OF THE SWEEP OSCILLATOR TUBE V601.

a. Before inserting the replacement tube, note that a spring contact cylinder is inside the center of the cavity rod (figure 8-4). Push this spring contact cylinder inward until it seats firmly. Position the open area of the spring contact cylinder as shown in figure 8-4.

b. Insert the tube very gently into the spring contact cylinder, plate end first, being careful that its feedback tab fits into the open section of the spring contact cylinder. Push the tube straight in and seat it gently. If the grid flange does not sear flush with the flange retainer, the spring clip has not been seated properly. If this occurs, withdraw the tube and repeat step a.

c. When the tube has been properly seated, turn the flat portion of the three "D" washers away from the grid flange and tighten the screws alternately, one turn at a time, to distribute the pressure. Tighten firmly, but do not overtighten.

CAUTION

It must be emphasized that this entire operation is extremely critical. Any undue strain imposed on the tube at any time will break the tube at the metal-glass seal.

d. Solder the wires previously removed from the cathode and filament of the tube, using a minimum of heat. Observe the color code of the wires.

e. Adjust the feedback tab (figure 7-5) on tube V601 for proper linearity of the sweep oscillator, in accordance with instructions in paragraph 7-9.

f. Install the end cover (figure 7-6) with four screws.

g. Check the calibration of the sweep oscillator in accordance with instructions in paragraphs 7-15 through 7-21.

h. Install the sweep generator into the cabinet (6, figure 8-1) with the eight screws (7) and (8).

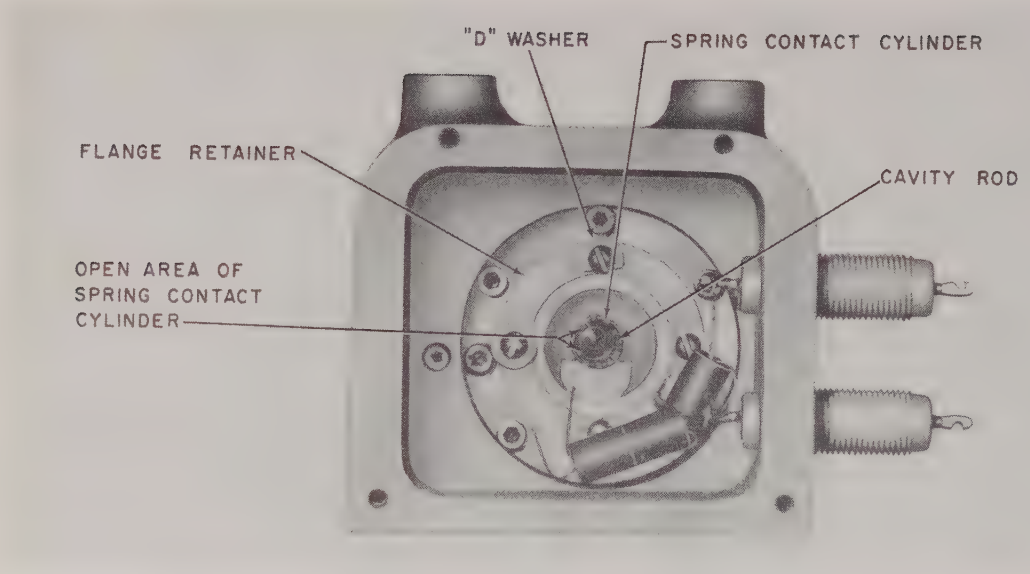


Figure 8-4. Sweep Oscillator with Tube (V601) Removed

8-21. SWEEP OSCILLATOR. The sweep oscillator must be removed from the sweep generator whenever its calibration is required or when defective parts warrant installation of a new sweep oscillator. Calibration of the oscillator requires the use of an alignment jig to hold the sweep oscillator in proper position for calibration and to provide access to the calibration adjustments.

8-22. REMOVAL OF THE SWEEP OSCILLATOR.

a. Remove eight screws (7 and 8, figure 8-1) and remove the sweep generator from the cabinet (6).

b. Remove plug P15 from receptacle J16 (figure 4-6).

c. Remove plug P1 from receptacle J12.

d. Disconnect the connectors P5 (figure 8-5), P6, and P7 (figure 4-6) of all three RF cables on the sweep oscillator.

e. Disconnect temporarily any cables which will interfere with the removal of the sweep oscillator.

f. Remove knob from SWEEP WIDTH switch S3 (5, figure 4-2).

g. Slide the shaft removal tool (figure 8-6) over the shaft of the SWEEP WIDTH switch S3 and unscrew the shaft locking nut. Pull the shaft outward as far as possible.

NOTE

If a new sweep oscillator is to be installed, omit step h below, which establishes a reference for calibration only, and proceed with step i.

h. Move the dial cursor (4, figure 4-2) of the FREQUENCY MEGACYCLES dial to the exact center of its travel. Rotate the FREQUENCY MEGACYCLES dial so that the 600-mc mark on the top scale coincides exactly with the dial cursor.

CAUTION

This exact position of the dial scale is very important for dial calibration. Do not rotate the FREQUENCY MEGACYCLES dial after this position has been determined.

i. Remove the two cap screws (39, figure 8-1) inside the shock mounts (93) under the sweep oscillator.

j. Support the sweep oscillator (37) and remove two cap screws (38).

k. Maneuver the sweep oscillator gently out of the sweep generator frame, being careful that it does not catch or bump against other components.

8-23. PREPARATION OF THE SWEEP OSCILLATOR FOR CALIBRATION.

a. Remove the cover (figure 7-6) from the wobbulator assembly.

CAUTION

After the cover has been removed, do not rest the sweep oscillator on any part of the wobbulator assembly. The wobbulator suspension is easily damaged.

b. Install the sweep oscillator in the alignment jig (figure 7-6).

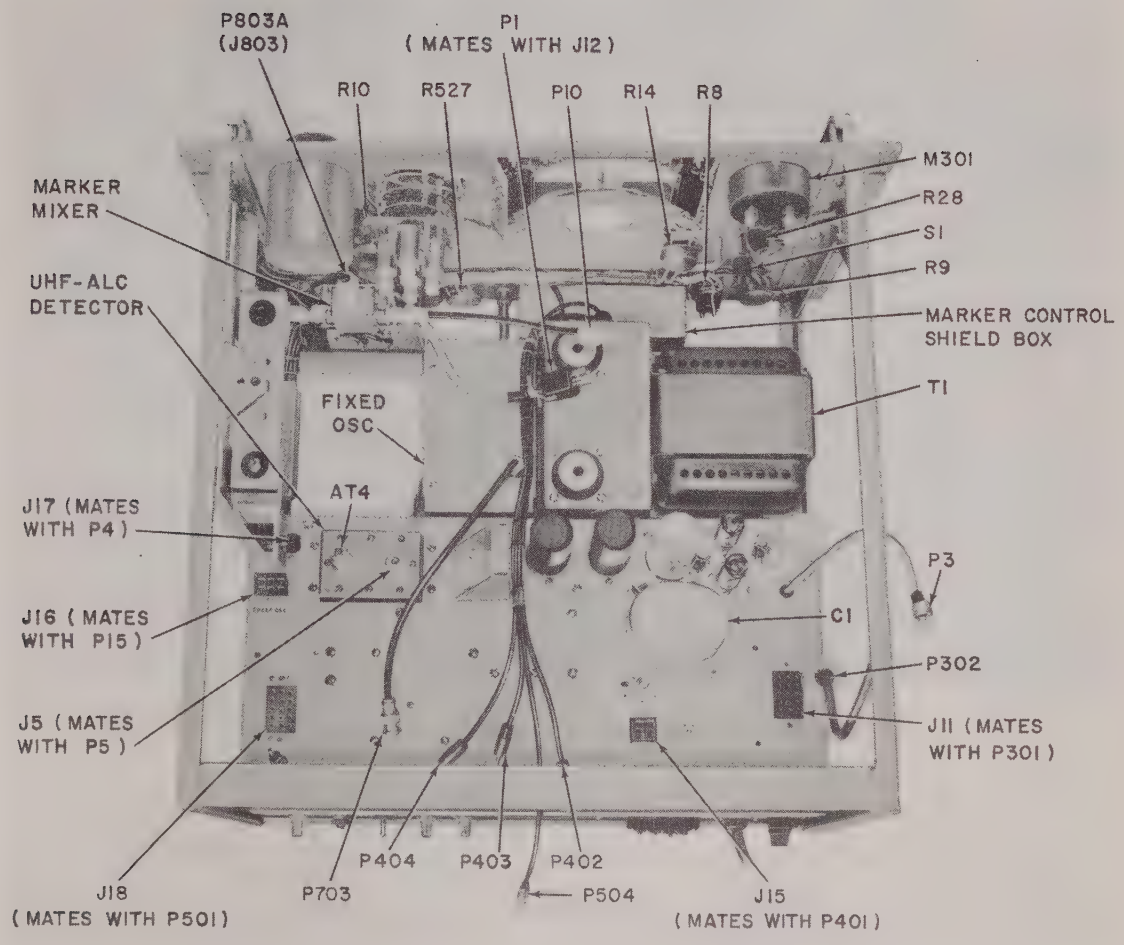


Figure 8-5. Top View of Sweep Generator with Plug-in Components Removed

c. With a small piece of stiff wire, make up a temporary index and mount it under the screw on the dial drive mechanism (figure 7-6). Adjust this temporary index to coincide exactly with the dial position as noted in paragraph 8-22, step h.

d. Connect the three probe cables to the sweep generator, using three standard RF test cables of suitable length.

NOTE

The use of extension RF cables will cause some deterioration of the flatness of the frequency response, but will not affect the accuracy of the calibration.

e. Connect the power cable P15 to receptacle J16 (figure 4-6) with a patch cord of suitable length.

f. Reconnect the cables in the sweep generator previously removed (paragraph 8-21, step e).

g. Install the knob and the shaft of SWEEP WIDTH switch S3.

h. Calibrate the sweep oscillator in accordance with instructions of paragraph 7-15.

i. When calibration has been completed, remove all test cables, the knob and shaft of the SWEEP WIDTH switch S3, and the temporary index.

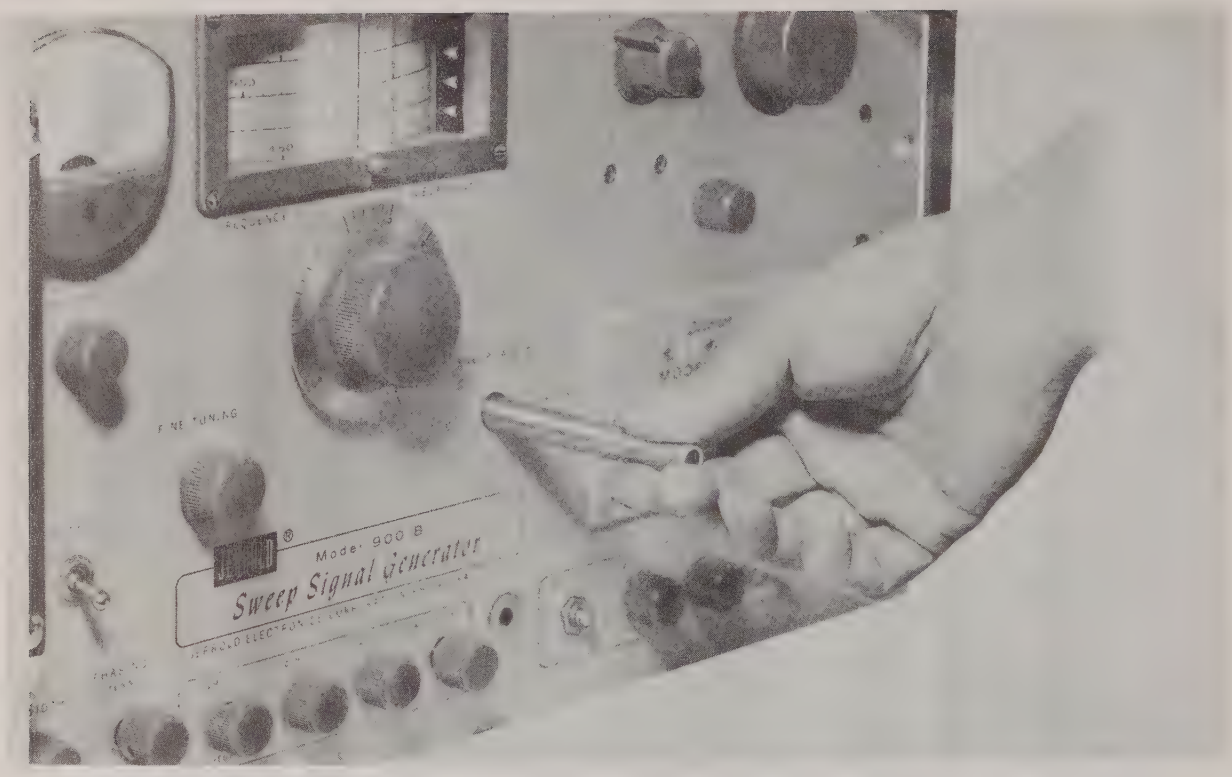


Figure 8-6. Removal of Shaft Locking Nut on Sweep Width Switch with Shaft Removal Tool

8-24. INSTALLATION OF THE SWEEP OSCILLATOR.

a. Maneuver the sweep oscillator gently into the sweep generator frame, being careful that it does not catch or bump against other components.

b. Support the sweep oscillator assembly and install two cap screws (38, figure 8-1) at the top of the sweep oscillator.

c. Install two cap screws (39 inside the shock mounts (93). Check to see that the sweep oscillator floats on its shock mounts (93) and (42) without binding.

d. Position the shaft on SWEEP WIDTH switch S3 (figure 7-6) and tighten the shaft locking nut with the shaft removal tool (figure 8-6).

e. Install the knob on the shaft of the SWEEP WIDTH switch S3 (5, figure 4-2).

f. Connect all cables previously disconnected.

g. Install connectors P5 (figure 8-5), P6, and P7 (figure 4-6 to jacks J5 (figure 8-5), J401 and J7 (figure 4-6 respectively.

h. Install plug P1 to receptacle J12.

i. Install plug P15 to receptacle J16.

j. If a new sweep oscillator assembly is being installed, calibrate the sweep oscillator in accordance with instructions in paragraphs 7-15 through 7-21.

k. Install the sweep generator into the cabinet (6, figure 8-1) with eight screws (7) and (8).

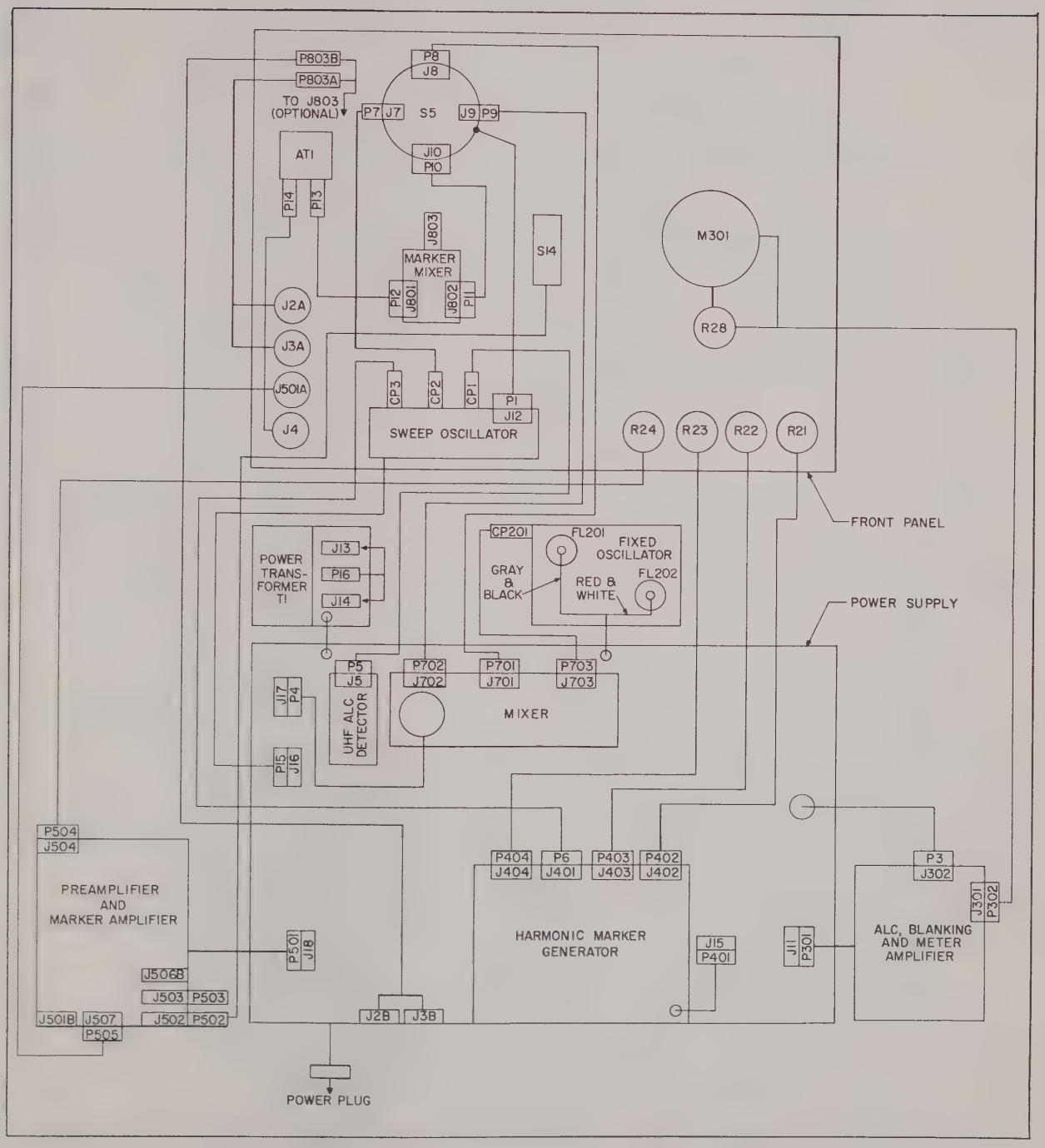


Figure 8-7. Model 1974 Sweep Signal Generator, Interconnection Pictorial Wiring Diagram

SEE INTERCONNECT DIAGRAM FIG. 8-7 FOR CONNECTIONS
TO TB4-1
AT-1
P8038
TO J803 OPTIONAL
J803 P803A
P14
P13
MARKE MIXER (REF.
J506A
P12 J801
R65
J2A
TB16
R67
R66
J3A
TB13
J501A
TO P503
TO P502
P17
P505
J1A
TO J18
TB15
R40
J4
R38
R39
R35
R36
R33
R34
TO J18-14
TO J18-12
POINT "A"
TO TB2-2
TO TB2-3
TO TB3-5
TO TB4-1
TO TB5-1
TO TB5-3
TO TB10-1
TO TB10-2
TO TB10-5
TO J18
TO J11-4
TO J11-9
TO J11-10
TO J18-1
TO J18-2
TO J18-3
TO J18-8
TO J18-9
TO J18-10
TO J18-11
TO J18-12
TO J18-14
CABLE TO POWER SUPPLY
SEE POINT "A" ON FIG. 8-9

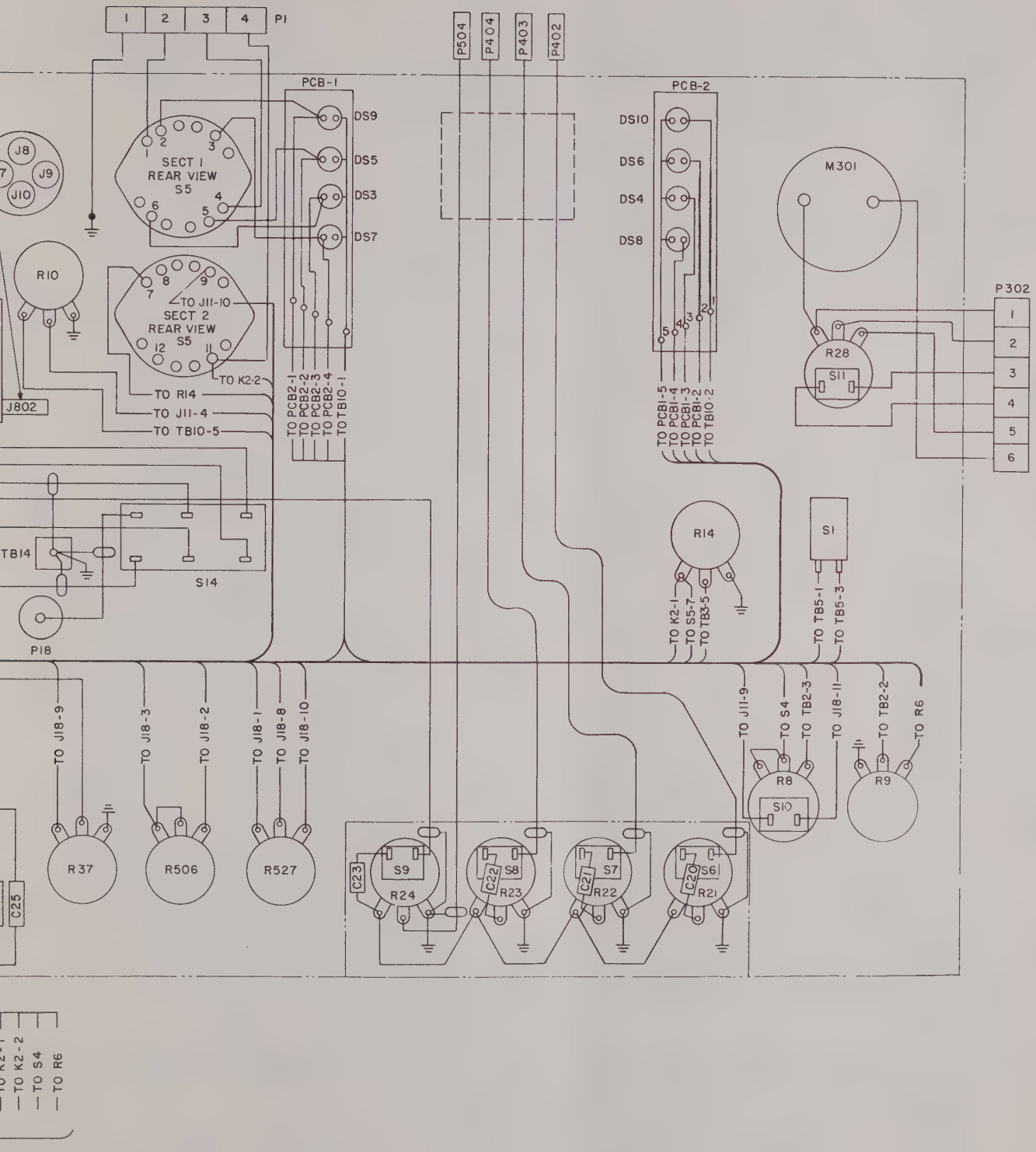
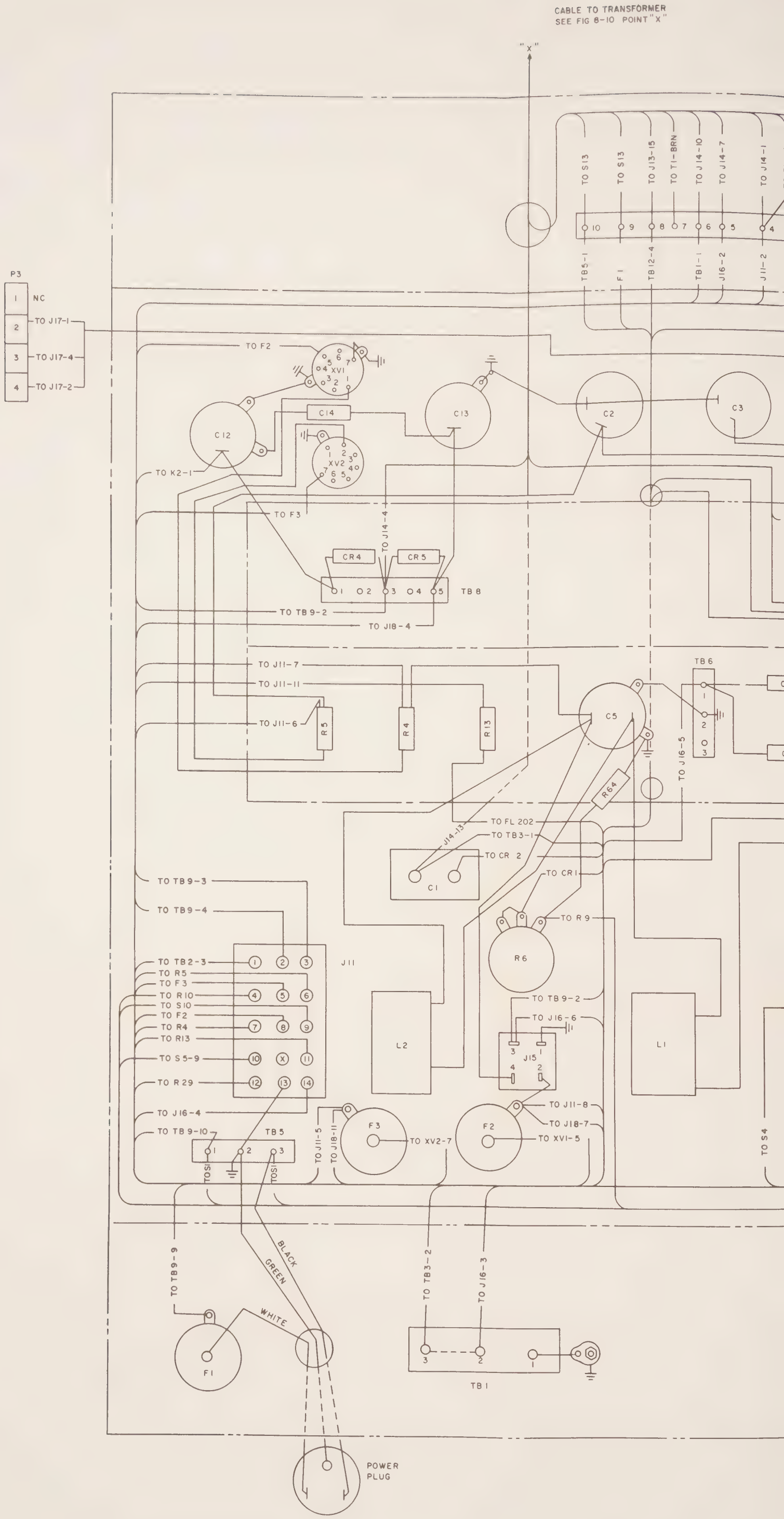


Figure 8-8. Front Panel Pictorial Wiring Diagram


CABLE TO TRANSFORMER
SEE FIG 8-10 POINT "X"
"X"
TO S13
TO S13
TO J13-15
TO T1-BRN
TO J14-10
TO J14-7
TO J14-1
10
9
8
7
6
5
4
TB5-1
F1
TB12-4
TB1-1
J16-2
J11-2
P3
1
NC
2
TO J17-1
3
TO J17-4
4
TO J17-2
TO F2
XV1
C14
C12
C13
C2
C3
TO K2-1
XV2
TO F3
TO J14-4
CR4
CR5
1
2
3
4
5
TB 8
TO TB9-2
TO J18-4
TO J11-7
TO J11-11
TO J11-6
R5
R4
R13
C5
TB6
TO J16-5
R64
TO FL 202
TO TB3-1
J14-13
TO CR 2
C1
TO CR1
TO TB9-3
TO TB9-4
TO R9
R6
J11
TO TB2-3
TO R5
TO F3
TO R10
TO S10
TO F2
TO R4
TO R13
TO S5-9
TO R29
TO J16-4
TO TB 9-10
TB 5
TO J11-5
TO J18-11
F3
TO XV2-7
F2
TO XV1-5
TO J11-8
TO J18-7
TO S4
L2
L1
TO TB9-2
TO J16-6
J15
TO TB9-9
BLACK
GREEN
WHITE
F1
TO TB3-2
TO J16-3
TB1
POWER
PLUG

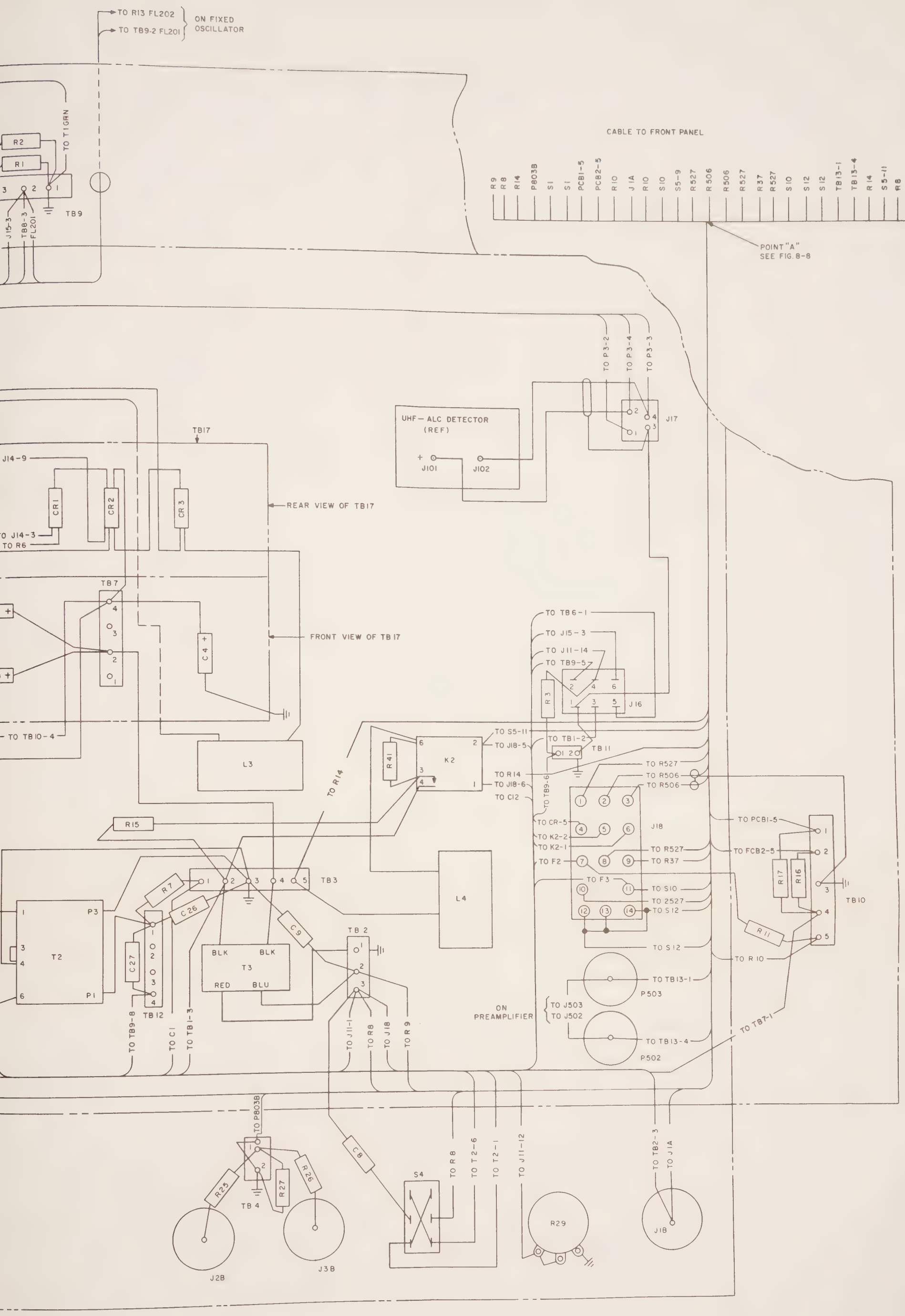


Figure 8-9. Power Supply Pictorial Wiring Diagram

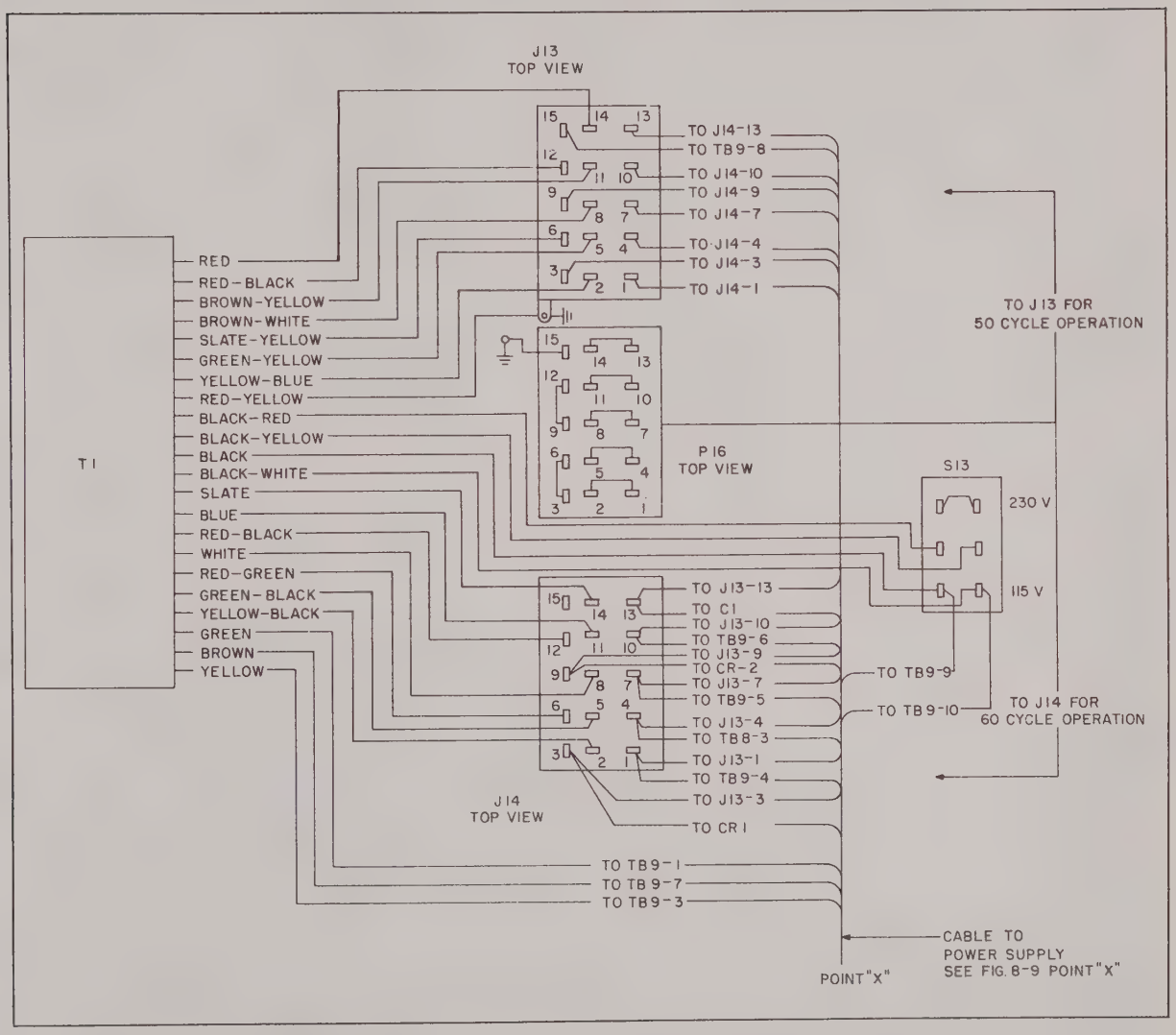


Figure 8-10. Transformer and Frequency Changing Plugs
(Part of Power Supply Pictorial Wiring Diagram)

TO P401-2
TB401
C407
C406
R425
L402
C403
T403
C404
R403
TB402
C405
XV401
C402
L401
Y401
C423
R401
C436
C435
TO P401-1
TO P401-3
TO P401-4
TO TB403-1
TO TB401-3
TO TB403-2
TO TB403-4
P401

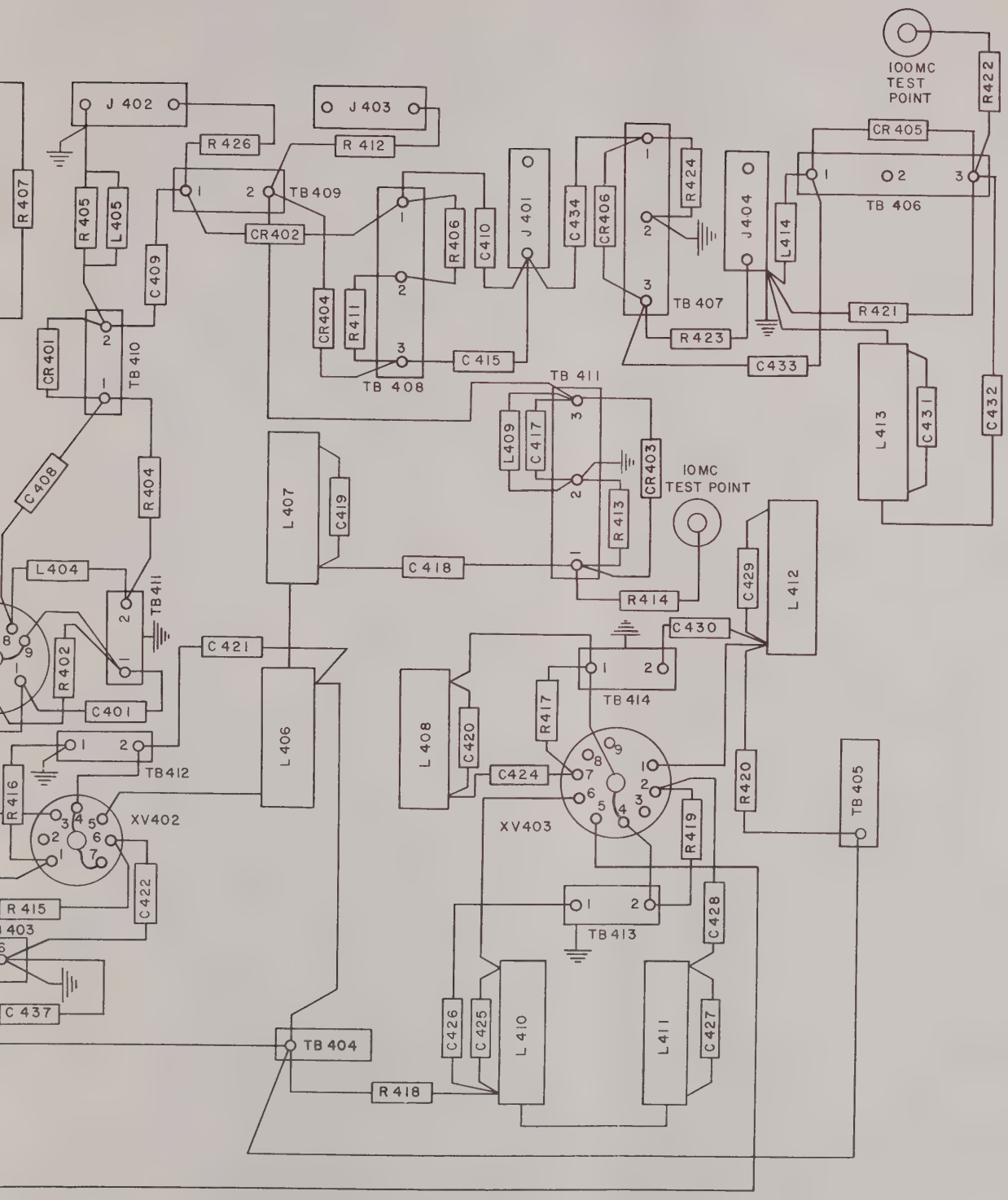
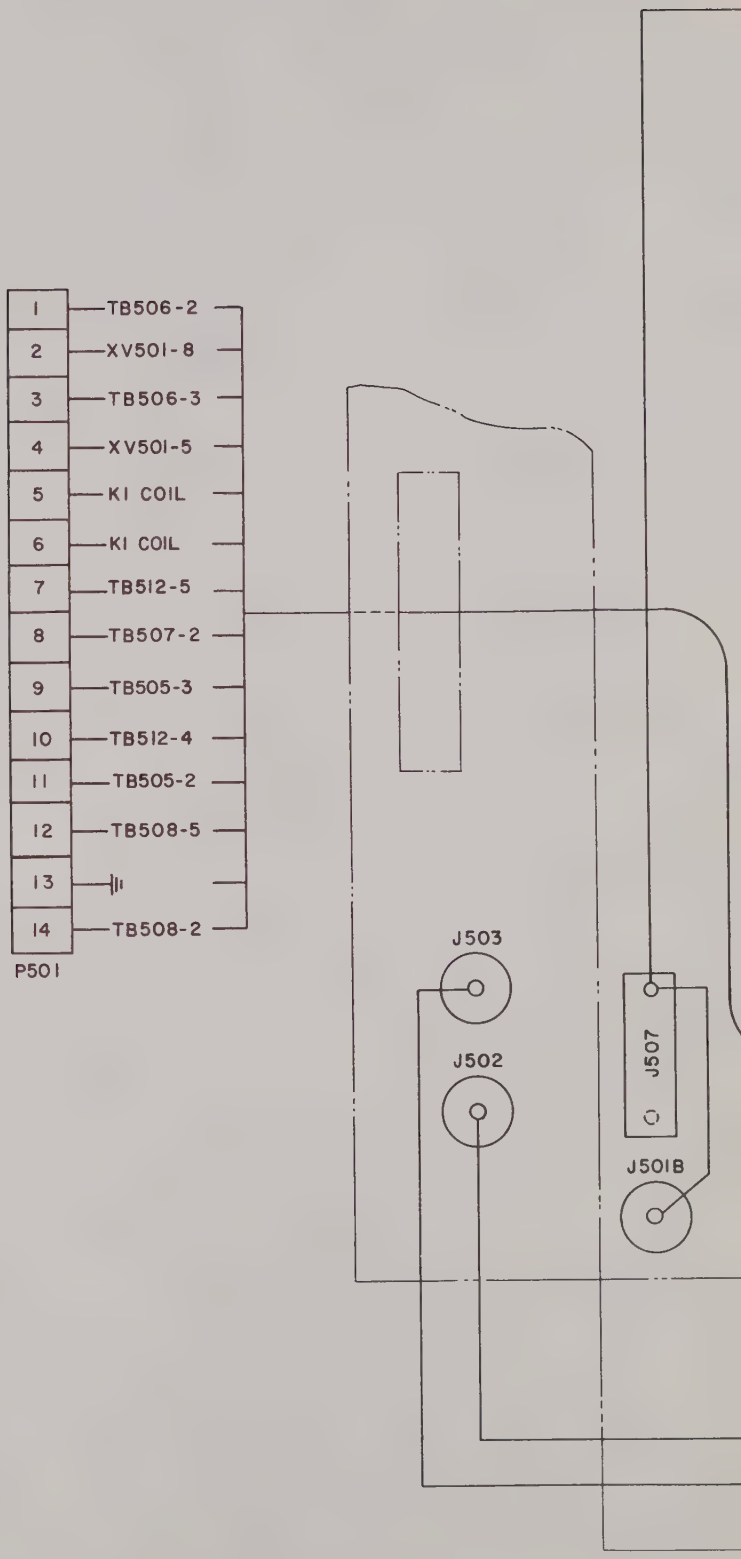


Figure 8-11. Harmonic Marker Generator Pictorial Wiring Diagram


1
2
3
4
5
6
7
8
9
10
11
12
13
14
TB506-2
XV501-8
TB506-3
XV501-5
K1 COIL
K1 COIL
TB512-5
TB507-2
TB505-3
TB512-4
TB505-2
TB508-5
TB508-2
P501
J503
J502
J507
J501B

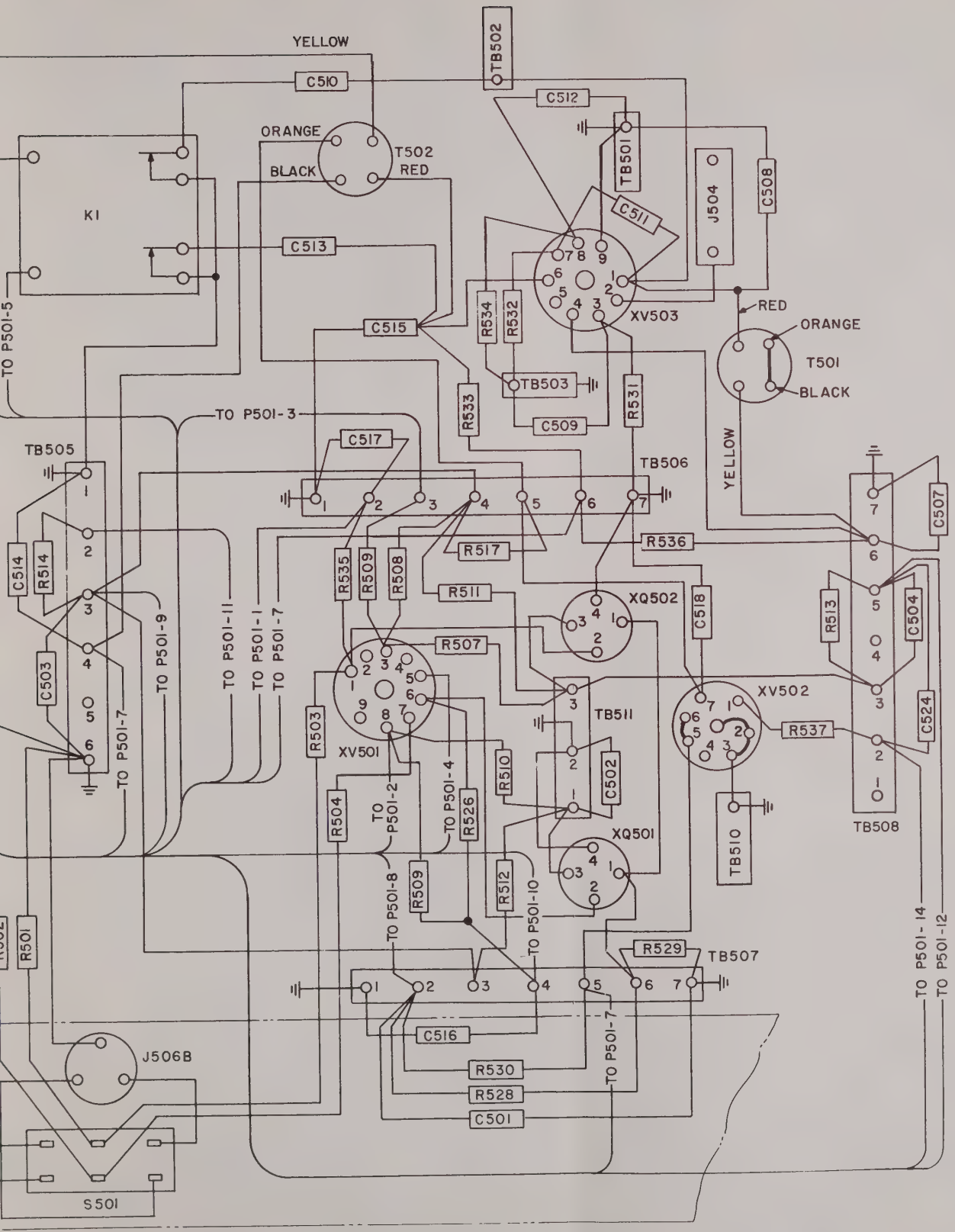
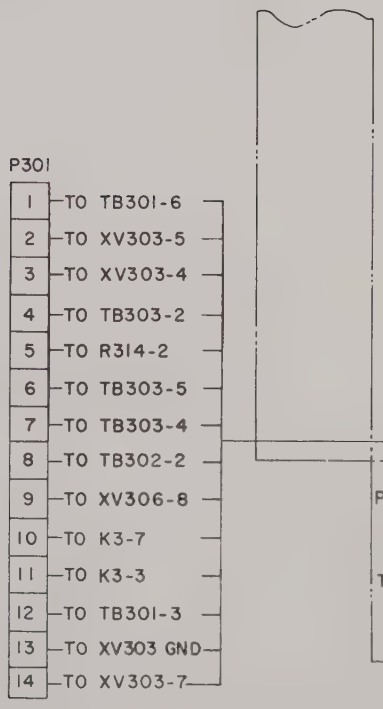


Figure 8-12. Preamplifier and Marker Amplifier Pictorial Wiring Diagram


P301
1 TO TB301-6
2 TO XV303-5
3 TO XV303-4
4 TO TB303-2
5 TO R314-2
6 TO TB303-5
7 TO TB303-4
8 TO TB302-2
9 TO XV306-8
10 TO K3-7
11 TO K3-3
12 TO TB301-3
13 TO XV303 GND
14 TO XV303-7

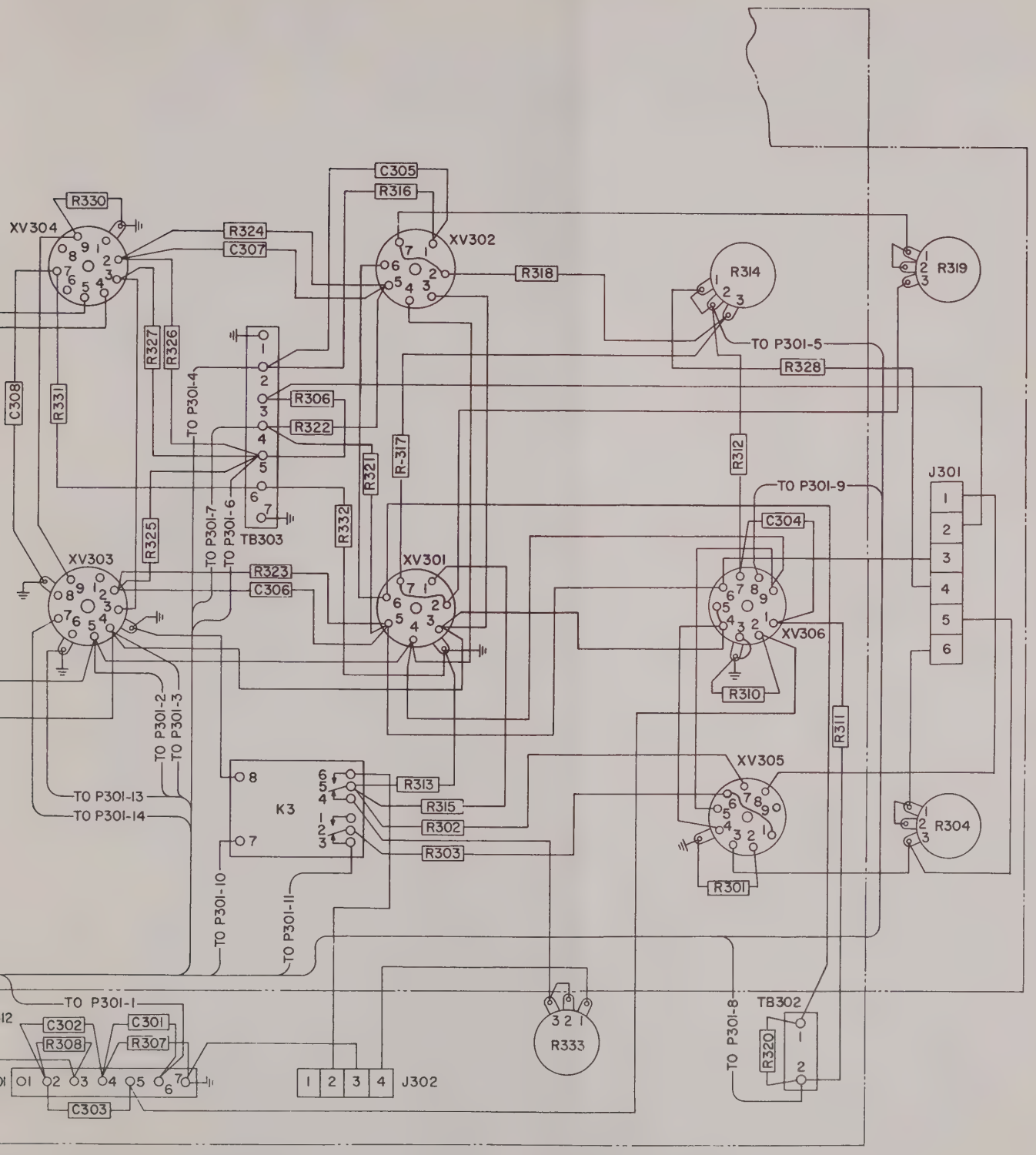


Figure 8-13. ALC, Blanking and Meter Amplifier Pictorial Wiring Diagram

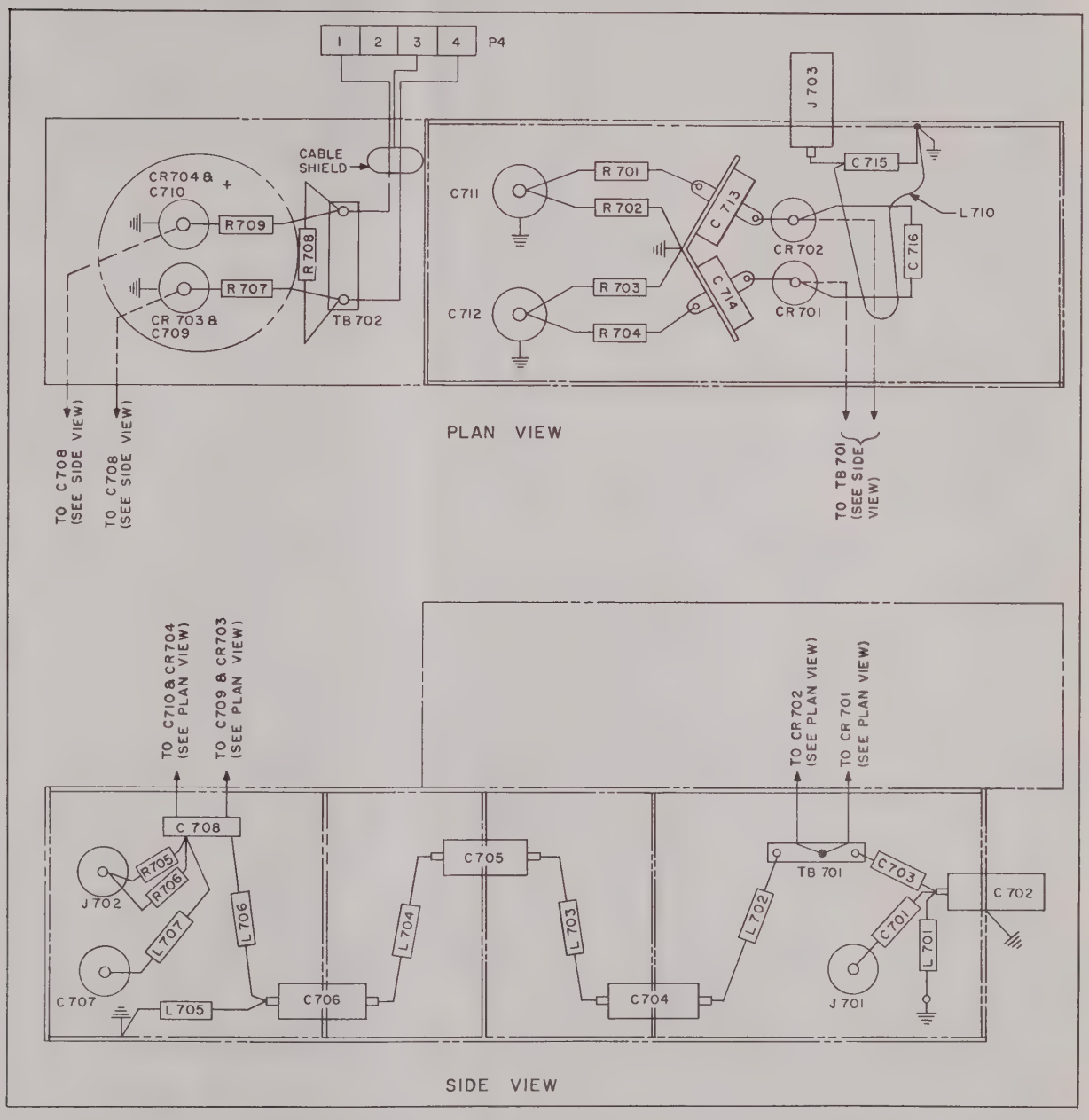
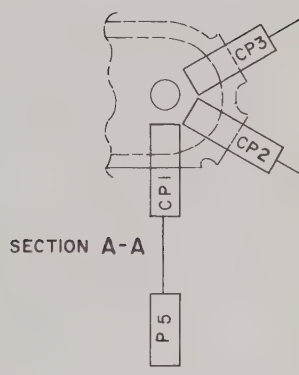


Figure 8-14. Mixer Pictorial Wiring Diagram



SECTION A-A

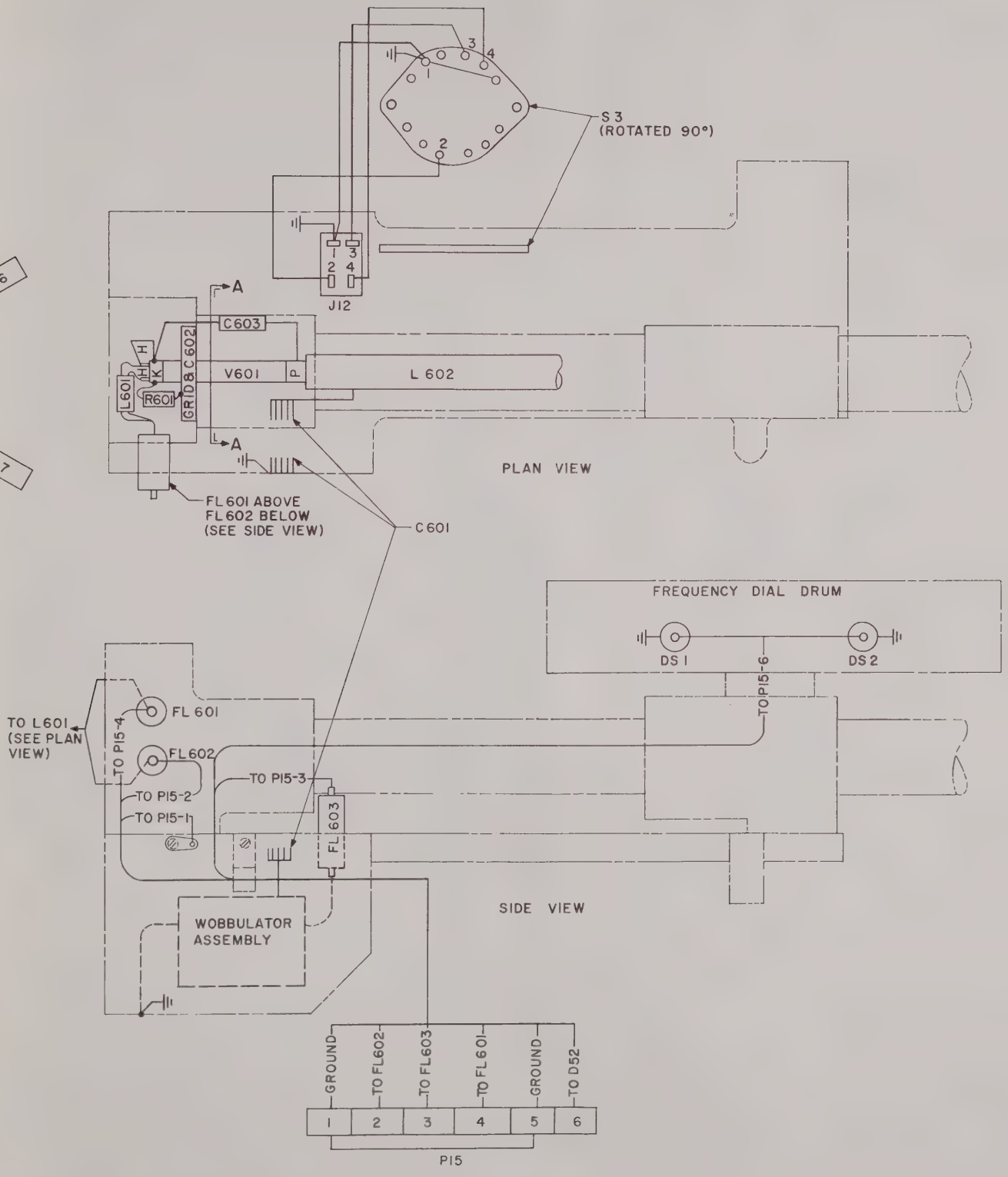


Figure 8-15. Sweep Oscillator Pictorial Wiring Diagram

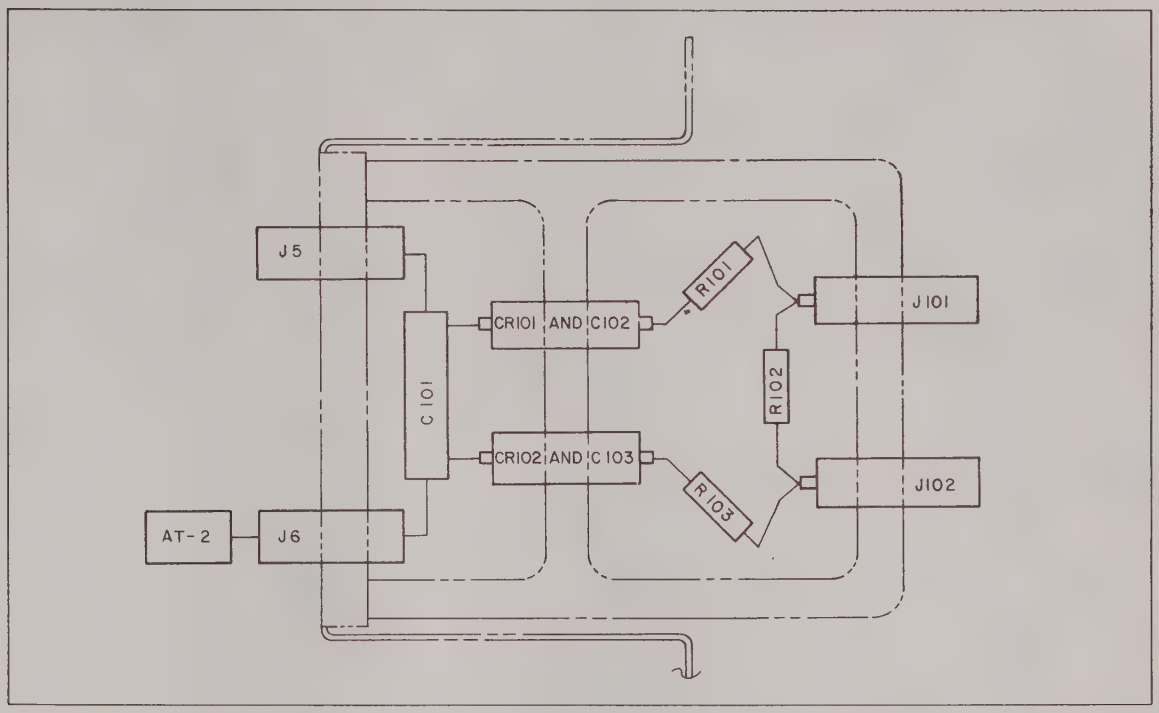


Figure 8-16. UHF-ALC Detector Pictorial Wiring Diagram

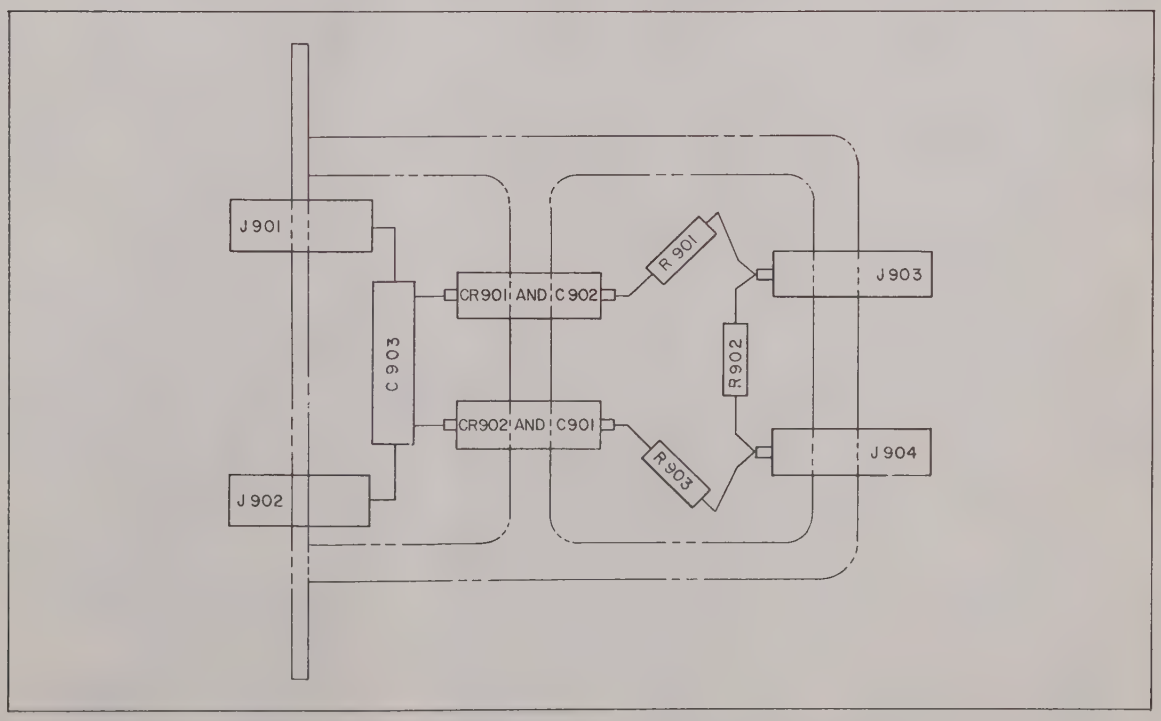


Figure 8-17. Model D50 Detector Pictorial Wiring Diagram

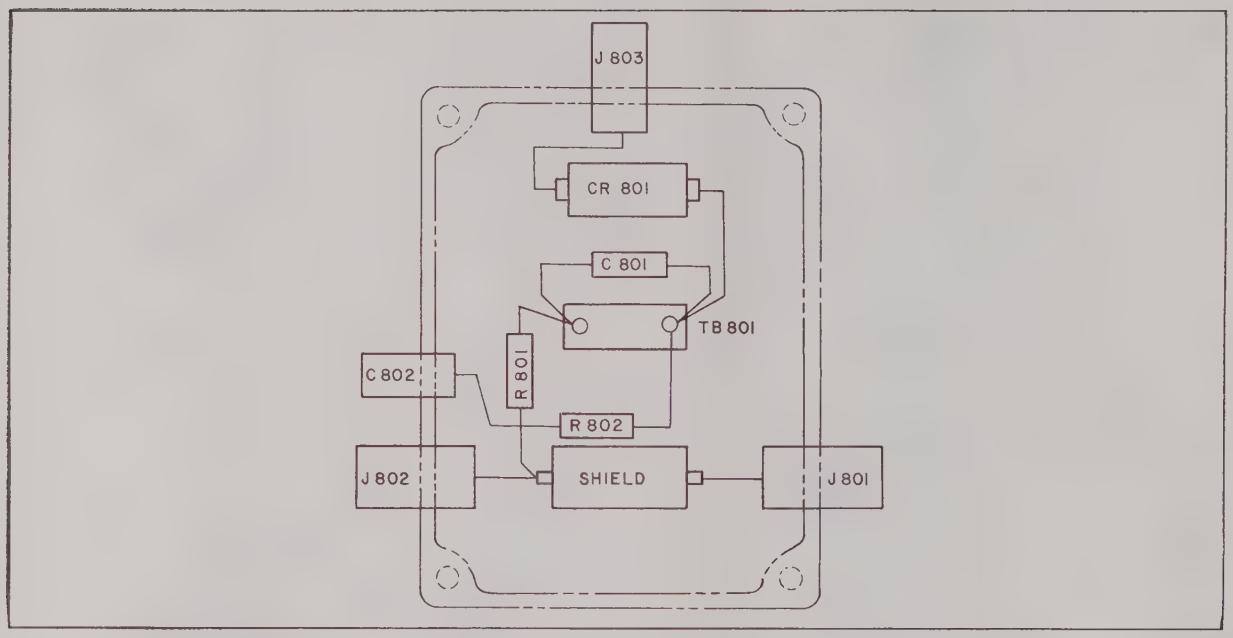


Figure 8-18. Marker Mixer Pictorial Wiring Diagram

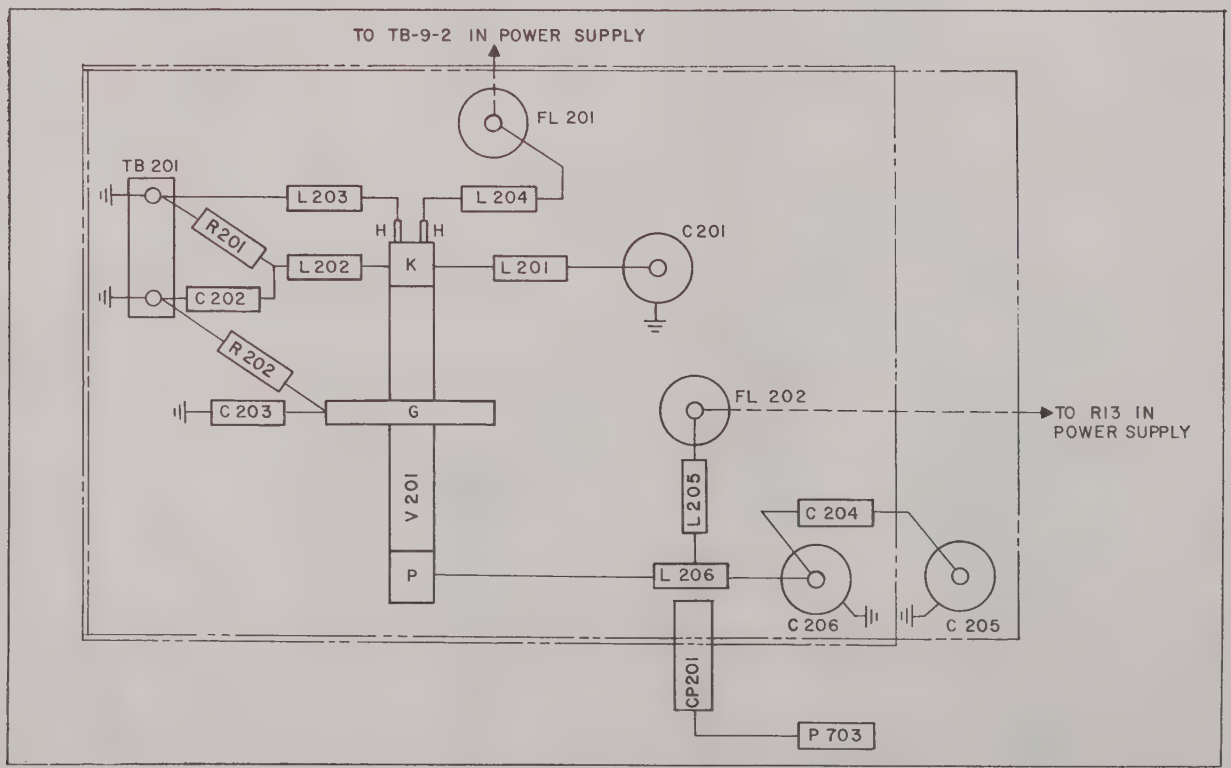


Figure 8-19. Fixed Oscillator Pictorial Wiring Diagram

6625-971-0347
1.279

T.O. 33A1-8-279-4

TECHNICAL MANUAL

ILLUSTRATED PARTS BREAKDOWN

SWEEP SIGNAL GENERATOR

MODEL 1974

(HAZELTINE)

AF33(600)40874

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

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SECTION I

INTRODUCTION

1-1. GENERAL.

1-2. This Illustrated Parts Breakdown lists, describes and illustrates the assemblies and detail parts of the Model 1974 Sweep Generator and is divided into four sections as shown in the Table of Contents. This equipment is manufactured by Jerrold Electronics Corp., Philadelphia, Pa. for Hazeltine Electronics Division, Hazeltine Corporation, Little Neck, N. Y.

1-3. The Illustrated Parts Breakdown is one of two handbooks describing the Model 1974 Sweep Generator. Parts referred to in the Handbook of Operations and Maintenance Instructions are listed and illustrated in the Illustrated Parts Breakdown.

1-4. TABLE OF CONTENTS.

1-5. The Table of Contents lists the first page numbers of the Introduction Section I, Numerical Index Section III, and Reference Designation Index Section IV. The title and page number of each illustration in Section II is also listed. Illustration titles are grouped and indented under group headings to show relationship to groups and components.

1-6. SECTION II.

1-7. GROUP ASSEMBLY PARTS LIST. The Group Assembly Parts List, Section II, is divided into assemblies, subassemblies and detail parts. Each assembly and subassembly in the Group Assembly Parts Breadkown that can be disassembled is immediately followed by a listing of their detail parts properly indented to show their relationship to the next higher assembly. When an assembly or subassembly appears on an illustration and is not disassembled at that location, reference is made to the illustration on which it appears for its detail breakdown. All assemblies and subassemblies are referenced to their next higher assembly when they are illustrated and listed for separate detail breakdowns. Each is illustrated to the degree necessary to identify its detail parts.

1-8. FIGURE AND INDEX NUMBERS. The figure and index number consists of two numbers separated by a dash. The number preceding the dash is the figure number of the illustration on which the part is shown. The number following the dash is the number assigned to the part on a particular illustration.

1-9. PART NUMBERS. Part numbers listed in the Part Number column are the manufacturers' or government standard part numbers. The applicable government specification is listed in the description column when government standard part numbers are used. Commercial hardware items are identified by the abbreviation "COML" in the Part Number column. When an item has not been assigned a part number it is listed as "NO NUMBER" in the Part Number column.

1-10. DESCRIPTION. The description column describes the assemblies, subassemblies and detail parts of the Model 1974 Sweep Generator properly indented to show assembly and disassembly relationship. The description for each part consists of the Item Name assigned by the design manufacturer.

1-11. Attaching parts follow immediately the parts they attach and preceding any detail parts of that item if the item is an assembly. Attaching parts are captioned "ATTACHING PARTS" and are followed by the separating symbol "---*---" to aid in distinguishing them from preceding and subsequent parts.

1-12. UNITS PER ASSEMBLY. The number in this column is the total quantity used per assembly. The use of the abbreviation "Ref" in the Units Per Assembly column indicates that the listing for that assembly or part has been repeated to provide reference to its previous listing. In such cases the description column will refer to the next higher assembly, where the quantity per assembly will appear.

1-13. USABLE ON CODE. This column contains coding information to indicate specific applicability of detail parts where two or more similar assemblies contain a number of identical detail parts. In such cases the assemblies are listed with a suitable code followed by the detail parts which are coded to indicate the assembly relationship. Where no coding appears in the Usable on Code column the parts are applicable for all of the assemblies. This column contains coding information to indicate specific applicability to serial number of the major component and its assemblies, subassemblies, and detail parts. Where no code appears in the Usable on Code column the parts apply for all components.

1-14. MANUFACTURER'S CODE SYMBOL (VENDOR'S INDEX). The following list of vendors identifies the vendor's code symbol used in the description column of Section II, Group Assembly Parts List.

MANUFACTURER'S CODE

Code	Manufacturers' Name and Address
00656	Aerovox Corp. New Bedford, Mass.
01113	Jerrold Electronics Corp. Philadelphia, Pa.

Code	Manufacturers' Name and Address
01121	Allen-Bradley Co. Milwaukee, Wis.
01766	International Crystal Mfg., Inc. Oklahoma City, Okla.
02660	Amphenol-Borg Electronics Corp. Broadview (Chicago), Ill.
03187	Garlock Sales Co. Kalamazoo, Mich.
03507	General Electric Co., Power Tube Department of Electronic Components Div. of Electronic, Atomic and Defense Systems Group Syracuse, N. Y.
03606	Radio Corp. of America Commercial Electronic Products Div. Camden, N. J.
04941	Walsco Electronics Corp. Rockford, Ill.
13327	Solitron Devices, Inc. Norwood, N. J.
14655	Cornell-Dubilier Electric Corp. South Plainfield, N. J.
24455	General Electric Co., Lamp Div. of Consumer Products Group Nela Park, Cleveland, Ohio
28520	Heyman Mfg. Co. Kenilworth, N. J.
40931	Minneapolis-Honeywell Regulator Co. Minneapolis, Minn.
44655	Ohmite Mfg. Co. Skokie, Ill.
49956	Raytheon Mfg. Co. Waltham, Mass.
55814	Sola Electric Co. Cicero, Ill.
56289	Spraque Electric Co. North Adams, Mass.
70417	Amplex Div. of Chrysler Corp. Detroit, Mich.
71002	Birnback Radio Co. New York, N. Y.
71590	Centralab, Div. of Globe Union, Inc. Milwaukee, Wis.
72136	Electro Motive Mfg. Co. Willimantic, Conn.
72699	General Instrument Corp. Newark, N. J.
72982	Erie Resistor Corp. Erie, Pa.
73345	Amperex Electronic Co., Div. of North American Phillips Co., Inc. Hicksville, N. Y.
73559	Carling Electric, Inc. Hartford, Conn.
75173	Jones, Howard B., Div. of Cinch Mfg. Corp. Chicago, Ill.
75915	Littelfuse, Inc. Des Plaines, Ill.
76854	Oak Mfg. Co. Chicago, Ill.
77342	Potter and Brumfield Princeton, Ind.
78189	Shakeproof Div. of Illinois Tool Works Elgin, Ill.
79136	Waldes, Kohinoor, Inc. Long Island City, N. Y.
79963	Zierick Mfg. Corp. New Rochelle, N. Y.
80583	Hammarlund Co., Inc. New York, N. Y.
81073	Grayhill Co. La Grange, Ill.
81349	Military Specifications
81860	Barry Controls, Inc. Watertown, Mass.
82389	Switchcraft, Inc. Chicago, Ill.
83324	Rosan, Inc. Newport Beach, Calif.
83325	SNC Mfg. Co. Oshkosh, Wis.
83330	Smith, Herman H., Inc. Brooklyn, N. Y.
84830	Lee Spring Co., Inc. Brooklyn, N. Y.
89032	Tinnerman, Products, Inc. New York, N. Y.
90201	Mallory, P. R., and Co., Inc. Detroit, Mich.
91146	Cannon Electric Co. Eastern Div. Salem, Mass.
91662	Elco Corp. Philadelphia, Pa.
94310	Tru Ohm Products Div. of Model Engineering and Mfg., Inc. Chicago, Ill.
94603	Waters Mfg., Inc. Wayland, Mass.
97965	Chicago Standard Transformer Corp. Chicago, Ill.
98291	Sealectro Corp. New Rochelle, N. Y.

1-15. SECTION III.

1-16. NUMERICAL INDEX. The Numerical Index constitutes Section III of the Illustrated Parts Breakdown and lists all parts shown in the Group Assembly Parts List. The stock number, figure and index number, quantity per article, source code and repair code are shown for these parts. The quantity per article shown is the total quantity for the equipment covered by this handbook.

1-17. Commercial parts are listed in the Numerical Index in alphabetical order by their item name. The Numerical Index is compiled in accordance with the numerical filing sequence described in paragraphs 1-18, 1-19, and 1-20.

1-18. Part numbers are arranged beginning from the extreme left-hand position and continue from left to right, one position at a time, until all parts are arranged in sequence, by part number.

1-19. FIRST POSITION ARRANGEMENT. The order of precedence in the part number arrangement on the extreme left hand (first) position of the part number is as follows: letters A through Z, numerals 0 through 9. Alphabetical O's are considered as numerical zeros.

1-20. SECOND AND SUCCEEDING POSITION ARRANGEMENT. The order of precedence in continuing the part number arrangement on the second and succeeding positions of the part number from left to right is as follows:

Space (blank column)	Dash (-)
Diagonal (slant)	Letters A through Z
Point (period)	Numerals 0 through 9

Alphabetical O's are to be considered as numerical zeros.

1-21. STOCK NUMBERS. Stock numbers appearing in the Numerical Index are supplied by the procuring department.

1-22. SOURCE CODING. When source codes have been assigned by the Department, the source code symbols, as defined in paragraphs 1-25 through 1-45 will be found in the Source Code column of the Numerical Index.

1-23. SOURCE CODE DEFINITIONS.

1-24. CODE "P" - PARTS UNDER INVENTORY STOCK CONTROL.

1-25. Code "P" identifies parts which may be requisitioned and installed by any level of maintenance consistent with the Command's authorized scope of maintenance. Code "P" is applied to parts on which usage is anticipated or known.

1-26. Code "PD" identifies parts which may be requisitioned and installed by Air Force activities authorized depot-level maintenance only. Restricted service manufacture of "PD" - coded parts is considered practicable but may be accomplished only after confirmation of non-availability from supply sources.

1-27. Code "P1" identifies parts which may be requisitioned and installed by any maintenance level consistent with the Command's authorized scope of maintenance. This code is applied to parts which are impractical to service manufacture.

1-28. Code "P1D" identifies parts which may be requisitioned and installed by Air Force activities authorized depot-level maintenance only. This code is applied to parts which are impractical for service manufacture.

1-29. Code "P2" identifies insurance-type spare parts which can be installed by any Air Force activity consistent with the Command's authorized scope of maintenance. This code is applied to such parts which are basically structural and for which no usage is anticipated or known; require special tools, templates and/or jigs and are very difficult, impractical or uneconomical to manufacture by Air Force activities. These items are not subject to periodic replacement or wear-out but may require infrequent replacement as a result of accidents or other unexpected occurrences.

1-30. Code "P2D" identifies insurance type parts which may be installed by Air Force activities which are authorized depot-level maintenance only. This code is applied to parts as described under Code "P2".

1-31. CODE "M" - MANUFACTURE, PARTS NOT PROCURED.

1-32. Code "M" identifies parts the manufacture and installation of which is within the capabilities of field maintenance activities. Procurement is not justified because of low usage or peculiar storage and installation factors. Needs are to be met by local manufacture only as required.

1-33. Code "M1" identifies parts which can be manufactured at activities authorized depot-level maintenance facilities. Procurement is not justified because of low usage or peculiar storage and installation factors. The needs of base activities are to be met by requisitioning from the appropriate depot.

1-34. CODE "A" - ASSEMBLE, ASSEMBLY, NOT PROCURED.

1-35. Code "A" identifies items capable of being assembled at any level of maintenance and is applied to assemblies of two or more parts, at least one of which is purchased and carries an individual part number and description.

1-36. Code "A1" identifies assemblies which can be assembled at Air Force activities authorized depot-level maintenance only and is applied to assemblies described under "A" code.

1-37. CODE "X" - PARTS CONSIDERED IMPRACTICAL FOR SERVICE MANUFACTURE OR PROCUREMENT.

1-38. Code "X" is applied to main structural members or similar parts, which, if required, would suggest extensive repair. The need for a part or parts coded "X" (wing spars, center section structure, etc.) should normally result in a recommendation to retire the article from service.

1-39. Code "X1" identifies parts applicable at any level of maintenance consistent with the Command's authorized scope of maintenance, and for which procurement of the next larger assembly so coded "P1" is normally justified; for example, an integral detail part such as a welded segment inseparable from its assembly, a part machined in, a matched set; or a part of an assembly which, if required, would suggest extensive reconditioning of each assembly.

1-40. Code "X1D" identifies parts described under the "X1" code but which are applicable to Air Force activities authorized depot-level maintenance only.

1-41. Code "X2" identifies parts applicable at any level of maintenance consistent with the Command's scope of maintenance, usage of which is not anticipated and which are impracticable for service manufacture. This type of item will not be stocked. Such parts shall be obtained from reclamation, or requisitioned through normal supply channels with supporting justification for one-time procurement and immediate use.

1-42. Code "X2D" identifies parts described under the "X2" code, but which are applicable to Air Force activities authorized depot-level maintenance only.

1-43. Code "U" - Parts not Procured, Manufactured, or Stocked. Code "U" is applied to installation drawings, diagrams, instruction sheets, field service drawing numbers, and parts not otherwise of supply significance, including obsolete parts, which can not be procured or service manufactured.

1-44. REPAIRABILITY CODING. When repairability codes have been assigned by the Department, the repairability code symbols as defined in paragraphs 1-47 through 1-54 will be found in the Repair Code column of the Numerical Index.

1-45. REPAIRABILITY CODE DEFINITIONS.

1-46. Code "S" identifies items which are nonrepairable and have no reclamation value. When these items fail they will be disposed of at user level as condemned material.

1-47. Code "B" identifies assemblies or parts that will be reconditioned at the user level by adjusting, cleaning, soldering broken connection, etc. If these items cannot be returned to serviceable condition by such means they will be disposed of at user level as condemned material. No repair parts or tools are specially procured for maintenance of these items.

1-48. Code "F" identifies items which will be repaired by the field level maintenance activities or contracted for repair at base level in accordance with T.O. 00-25-68. Normal servicing will be done by organizational level maintenance. Selected parts, tools, and technical order data are procured and provided to applicable field level maintenance activities for repair of these items. No specialized repair activity (SRA) is established for these items. If they cannot be returned to serviceable condition by the field level maintenance activity with the parts and tools provided they will be disposed of as condemned material. Hi Valu and Critical Items, however, will be turned in to supply and disposition instructions obtained from the applicable Inventory Manager.

1-49. Code "D" identifies items on which a limited degree of repair can be accomplished by field level maintenance activities. Normal servicing will be done at organizational level. SRA is established for overhaul of these items. A range of repair parts, tools, and technical order data consistent with the capability of repair are procured and provided to applicable field maintenance activities. Because of the design characteristics and complexity of repair, the degree of repair which is authorized on these items at field maintenance level is necessarily determined by the degree of technical skills required and the cost of special tools, special test equipment, spare parts, and the predicted frequency of failure generation. If these items cannot be returned to serviceable condition with authorized parts and tools they will be returned to supply for shipment to the designated SRA.

1-50. Code "DM" identifies items to which all the conditions of code "D" apply except that repair beyond field capability will be done by the Mobile Depot Activity (MDA). If the MDA cannot repair these items, they will determine whether these items should be condemned or sent to the SRA.

1-51. Code "L" identifies items that will be repaired only at designated SRA. Repair parts and tools for repair are procured and provided only to these authorized activities. Required functional checkout and bench check equipment may be provided to applicable organizational and held level maintenance activities for accomplishing external adjustment or calibration and for verifying serviceability of these items. If they are found unserviceable they will be turned into supply for shipment to the SRA.

1-52. Code "LM" identified items to which all conditions of Code "L" apply except that repair will be accomplished by MDA. If MDA cannot repair these items, they will determine whether these items should be condemned or sent to the SRA.

1-53. REFERENCE DESIGNATIONS.

1-54. The Reference Designation Index, Section IV, lists reference designations for all electrical and electronic parts shown on schematic wiring diagrams and test contained in the Operation and Maintenance Instructions handbook. The complete reference designation for a part consists of the class of item to which the part belongs followed by a number identifying the specific part. This index is arranged in alpha-numerical sequence by reference designations.

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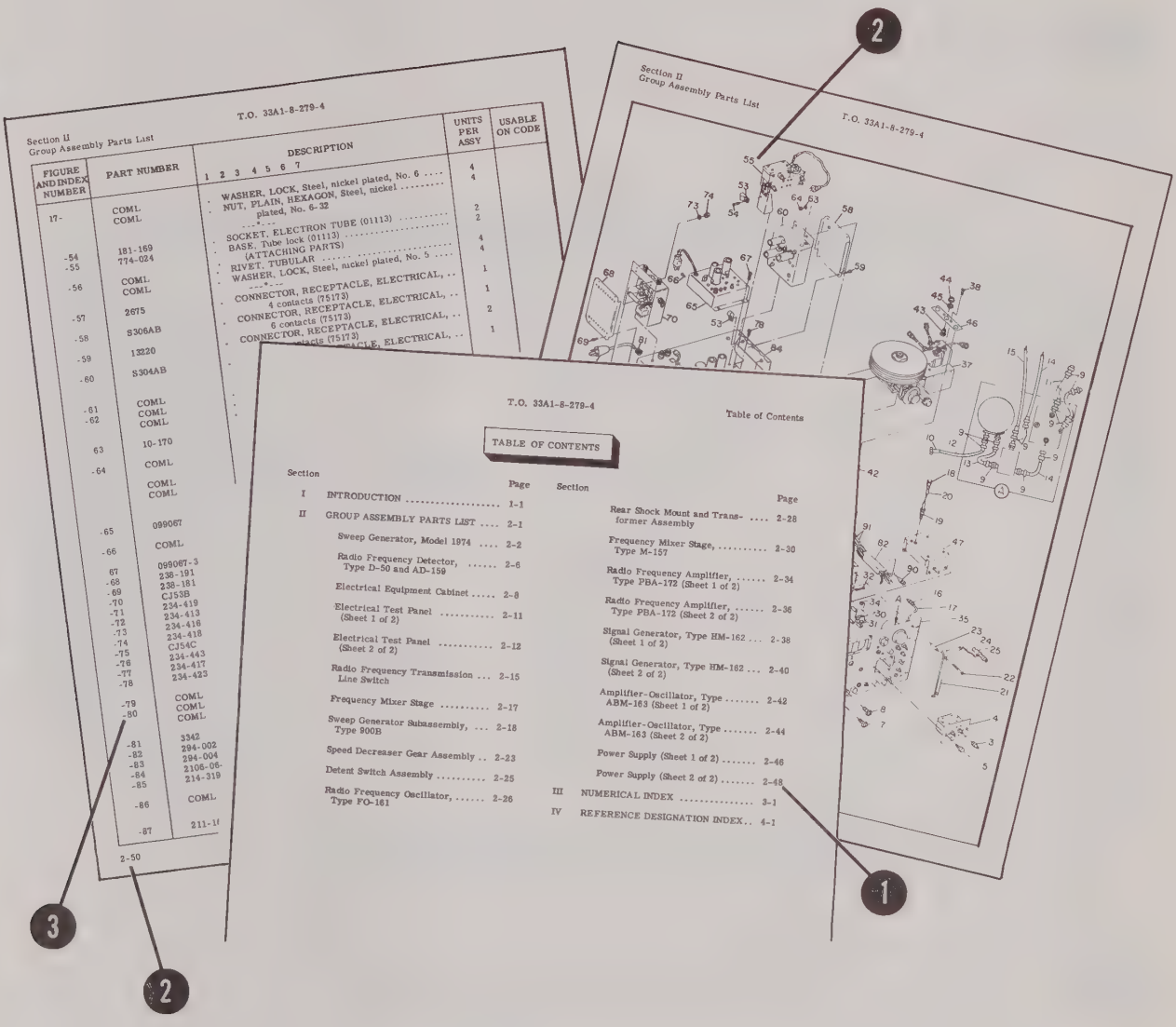
T.O. 33A1-8-279-4
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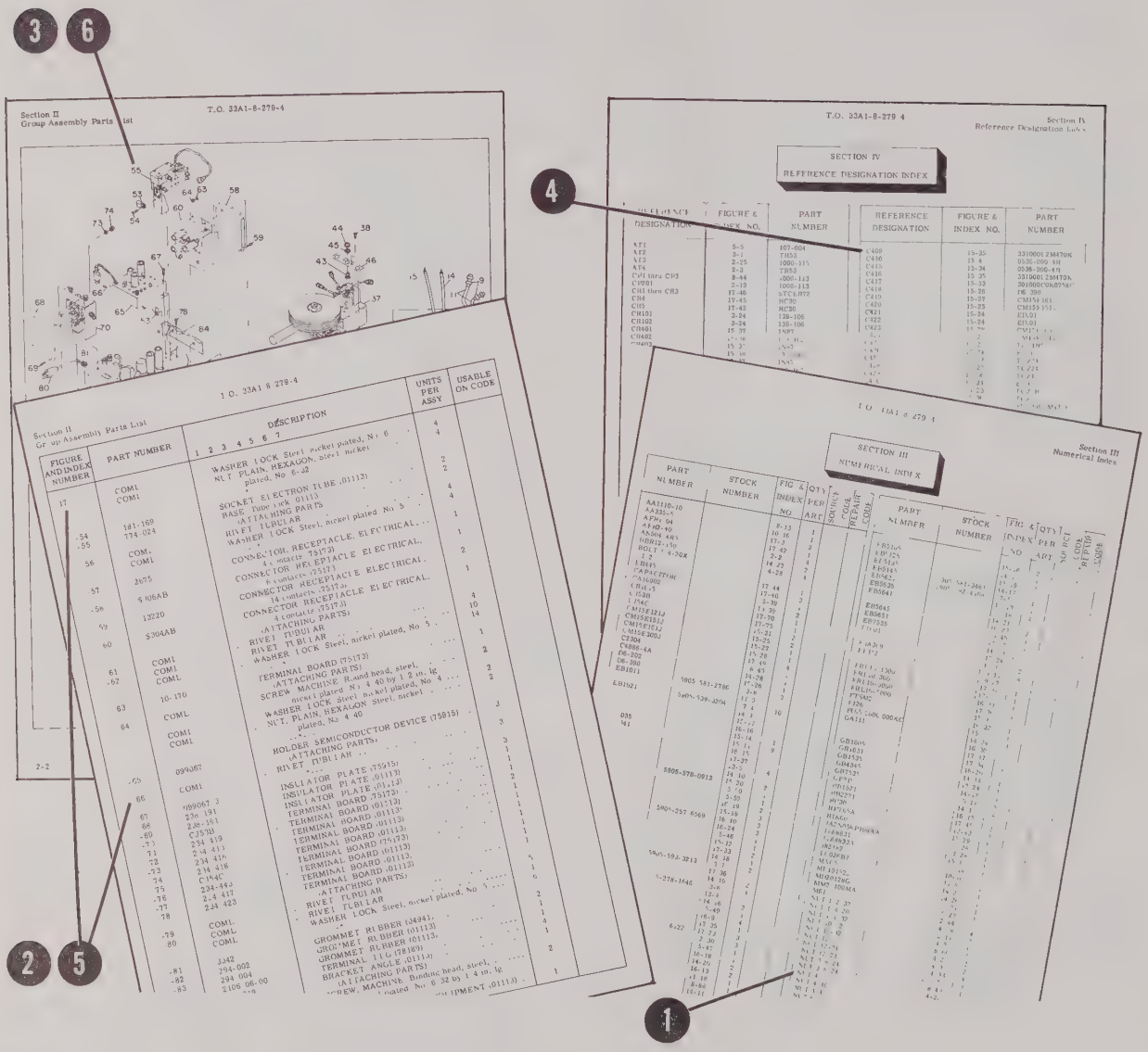
WHEN THE PART NUMBER IS NOT KNOWN

1. Determine the function and application of the part required. Turn to the Table of Contents and select the most appropriate title. Note the illustration page number.

2. Turn to the page indicated and locate the desired part on the illustration.

3. From the illustration, obtain the index number assigned to the part desired. Refer to the accompanying description for specific information regarding the part.

HOW TO USE THE ILLUSTRATED PARTS BREAKDOWN



WHEN THE PART NUMBER OR
REFERENCE DESIGNATION IS KNOWN

1. When the part number is known, refer to Section III Numerical Index. Locate the part number and note the figure and index number assigned to the part number.

2. Turn to the figure number indicated and locate the index number referenced in the Numerical Index.

3. If a pictorial representation of the part, or its location is desired, refer to the same index number on the accompanying illustration.

4. When the reference designation is known, refer to Section IV, Reference Designation Index. Locate the reference designation and note the figure and index number assigned.

5. Turn to the figure indicated and locate the index number referenced in the Reference Designation Index.

6. If a pictorial representation of the part, or its location is desired, refer to the same index number on the accompanying illustration.

Figure 1. Sweep Generator, Model 1974

SECTION II

GROUP ASSEMBLY PARTS LIST

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
2-	111406	GENERATOR, SWEEP, Model 1974	1	
-1	650377	. PLATE, IDENTIFICATION	1	
		(ATTACHING PARTS)		
-2	AN504-4R3	. SCREW	4	
		---*---		
-3	TR53	. DUMMY LOAD, ELECTRICAL (01113)	1	
-4	822-048	. DETECTOR, RADIO FREQUENCY, Type D-50 ...	1	
		(01113) (See figure 3 for detail breakdown)		
		(ATTACHING PARTS)		
-5	COML	. THUMBSCREW, Steel, nickel plated, No. 10-32 ..	2	
		by 3/16 in. lg		
		---*---		
-6	812-024	. CABINET, ELECTRICAL EQUIPMENT (01113)...	1	
		(See figure 4 for detail breakdown)		
		(ATTACHING PARTS)		
-7	COML	. SCREW, ASSEMBLED WASHER, Steel, nickel....	4	
		plated, No. 12-24 by 1/2 in. lg		
-8	COML	. SCREW, ASSEMBLED WASHER, Steel, nickel....	4	
		plated, No. 12-24 by 1 in. lg		
		---*---		
2-	655-058	. CABLE ASSEMBLY, RADIO FREQUENCY	2	A
		(01113)		
2-	655-059	. CABLE ASSEMBLY, RADIO FREQUENCY.....	1	B
		(01113)		
2-	655-060	. CABLE ASSEMBLY, RADIO FREQUENCY	1	C
		(01113)		
2-	655-061	. CABLE ASSEMBLY, RADIO FREQUENCY.....	2	D
		(01113)		
2-	655-062	. CABLE ASSEMBLY, RADIO FREQUENCY.....	1	E
		(01113)		
-9	UG-88/U	. . CONNECTOR, PLUG, ELECTRICAL, ...	2	
		1 contact (02660)		
-10	183-222	. . CONNECTOR, RECEPTACLE	1	D
		ELECTRICAL, 1 contact (01113)		
-11	RG-55A/U	. . CABLE, RADIO FREQUENCY, 7-1/4 in. lg ...	2	A
		(81349)		
-12	RG-55A/U	. . CABLE, RADIO FREQUENCY, 6-1/4 in. lg ...	1	B
		(81349)		
-13	RG-55A/U	. . CABLE, RADIO FREQUENCY, 5-1/8 in. lg ...	1	C
		(81349)		
-14	RG-55A/U	. . CABLE, RADIO FREQUENCY, 8-5/8 in. lg ...	2	D
		(81349)		
-15	RG-58/U	. . CABLE, RADIO FREQUENCY, 32 in. lg	1	E
		(81349)		
2-	1000-112	. CABLE ASSEMBLY, RADIO FREQUENCY.....	1	
		(01113)		
-16	31-206	. . PLUG, TIP (02660)	1	
-17	RG-58/U	. . CABLE, RADIO FREQUENCY, 13-1/4 in. lg ..	1	
		(02660)		
2-	659-120	. CABLE ASSEMBLY, RADIO FREQUENCY.....	1	
		(01113)		
-18	UG-88/U	. . CONNECTOR, PLUG, ELECTRICAL, ...	1	
		1 contact (02660)		
-19	1000-113	. . PROBE, WAVEGUIDE (01113)	1	

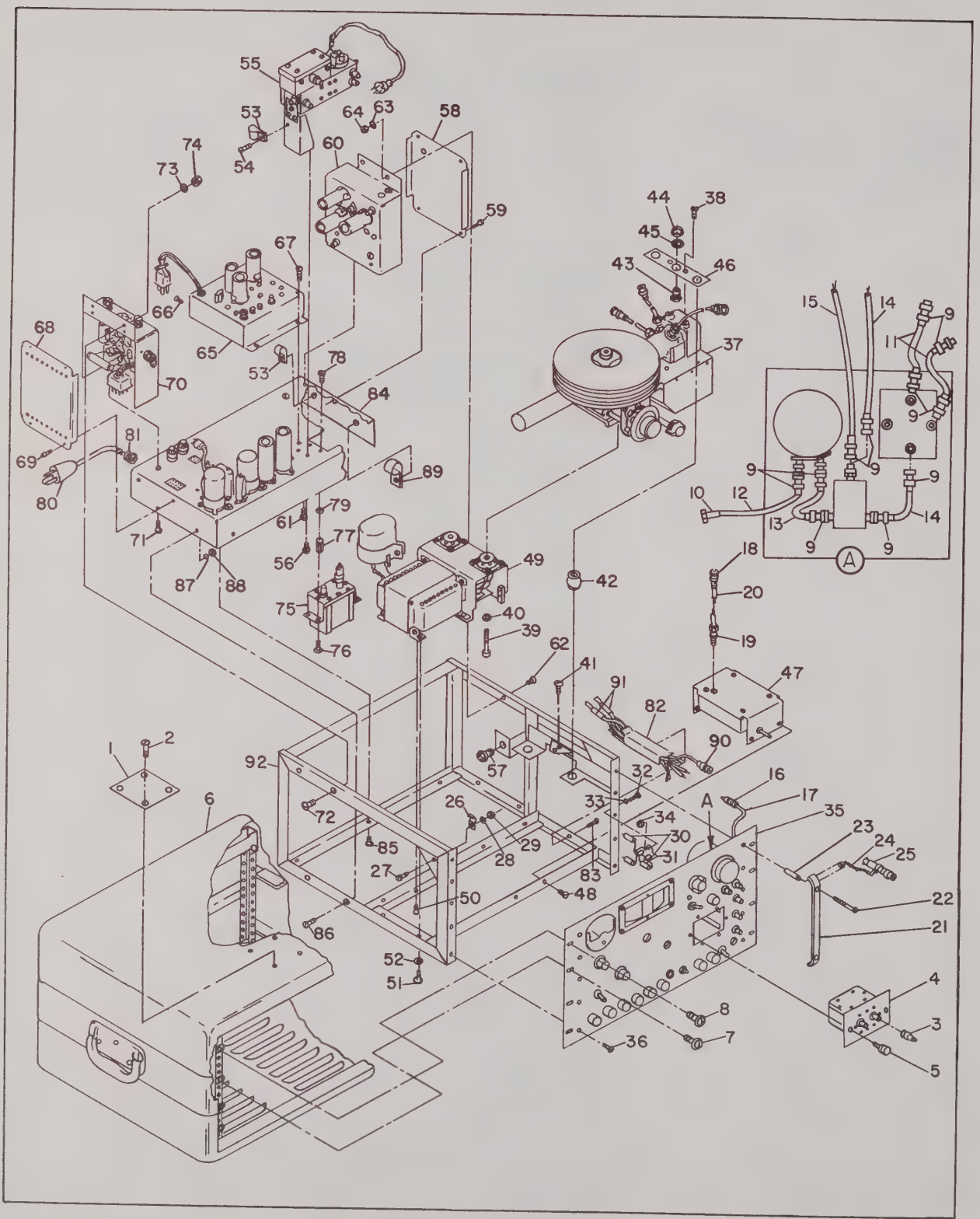
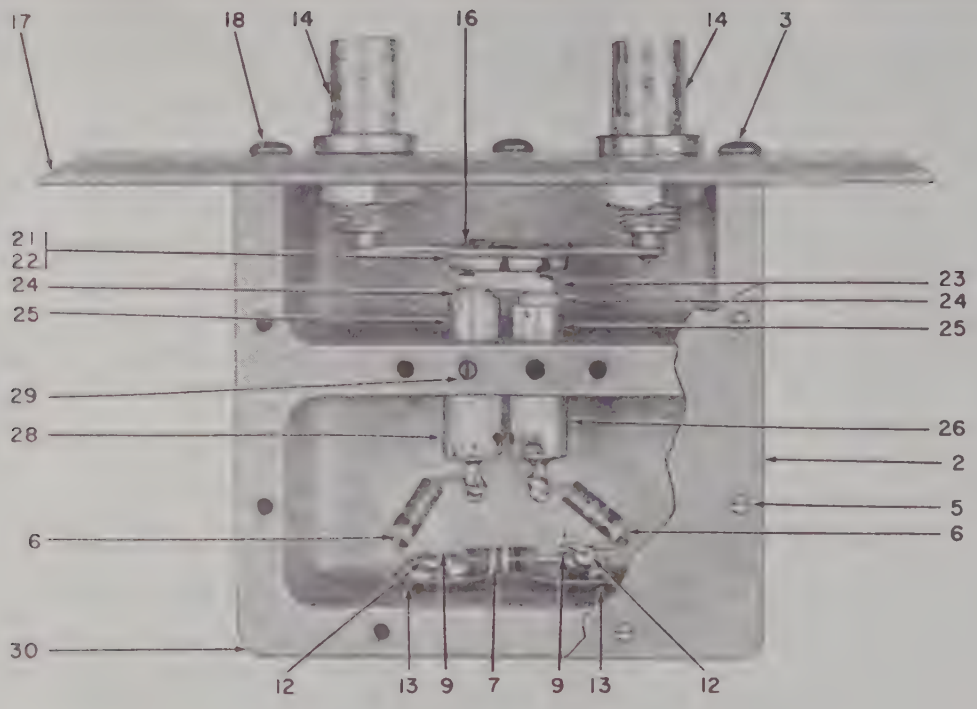


Figure 2. Sweep Generator, Model 1974

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
2-20	RG-55A/U	. . CABLE, RADIO FREQUENCY, 14-1/4 in. lg .. (02660)	1	
-21	203-115	. HANDLE, BOW (01113) ..... (ATTACHING PARTS)	2	
-22	COML	. SCREW, MACHINE, Oval head, steel, nickel ..... plated, No. 10-32 by 2.000 in. lg ---*---	4	
-23	226-017	. SPACER, SLEEVE (01113)	4	
-24	1000-114	. CHAIN, BREAD (01113)	1	
-25	1000-115	. ATTENUATOR, FIXED (01113)	1	
-26	78	. STRAP, RETAINING (79963) ..... (ATTACHING PARTS)	2	
-27	COML	. SCREW, MACHINE, Binding head, steel, nickel... plated, No. 6-32 by 3/8 in. lg	1	
-28	COML	. WASHER, LOCK, Steel, nickel plated, No. 6	1	
-29	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated,.... No. 6-32 ---*---	1	
-30	EB3305	. RESISTOR, FIXED, COMPOSITION, 33 ohms..... ±5 pct, 1/2 w (01121)	3	
-31	234-417	. TERMINAL BOARD (01113)..... (ATTACHING PARTS)	1	
-32	COML	. SCREW, MACHINE, Binding head, steel, nickel .. plated, No. 6-32 by 3/8 in. lg	1	
-33	COML	. WASHER, LOCK, Steel, nickel plated, No. 6	1	
-34	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated,.... No. 6-32	1	
-35	811-308	. PANEL, TEST, ELECTRICAL (01113) (See..... figure 5 for detail breakdown) (ATTACHING PARTS)	1	
-36	COML	. SCREW, MACHINE, Flat head, steel, nickel..... plated, No. 10-32 by 1/2 in. lg ---*---	6	
2-37	815-124	. SWEEP GENERATOR SUBASSEMBLY, ... Type 900B (01113) (See figure 8 for detail breakdown) (ATTACHING PARTS)	1	
-38	COML	. SCREW, CAP, SOCKET HEAD, Button head, ... steel, nickel plated, No. 1/4-20 by 1/2 in. lg	2	
-39	COML	. SCREW, CAP, SOCKET HEAD, Filister head,.... steel, nickel plated, 10-32 by 1-1/2 in. lg	2	
-40	COML	. WASHER, FLAT, Phosphor bronze, nickel ..... plated, No. 10 ---*---	2	
-41	COML	. SCREW, CAP, SOCKET HEAD, Button head, ... steel, nickel plated, 1/4-20 by 1/2 in. lg (used for shipping purposes only)	1	
-42	302-2	. MOUNT, RESILIENT (81860)	2	
-43	221-191	. BUSHING, MACHINE THREAD (01113) ..... (ATTACHING PARTS)	1	
-44	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated, ... 1/2-32	1	
-45	COML	. WASHER, LOCK, Steel, cadmium plated, ... 1/2 in. id by 3/4 in. od by 1/16 in. thk ---*---	1	
-46	213-329	. PLATE, RESILIENT MOUNT (01113)	1	
-47	811-311	. OSCILLATOR, RADIO FREQUENCY, Type ..... FO-161 (01113) (See figure 11 for detail breakdown)	1	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
2-		(ATTACHING PARTS)		
-48	COML	. SCREW, MACHINE, Binding head, steel, nickel .. plated, No. 6-32 by 3/8 in. lg	4	
		---*---		
-49	811-309	. REAR SHOCK MOUNT AND TRANSFORMER .... ASSEMBLY (01113) (See figure 12 for detail breakdown)	1	
		(ATTACHING PARTS)		
-50	COML	. SCREW, MACHINE, Binding head, steel, nickel .. plated, No. 10-32 by 3/8 in. lg	4	
-51	COML	. SCREW, MACHINE, Binding head, steel, nickel .. plated, No. 8-32 by 3/8 in. lg	2	
-52	COML	. WASHER, FLAT, Steel, cadmium plated, No. 10 ..	2	
		---*---		
-53	835	. CLAMP, LOOP (83330)	2	
		(ATTACHING PARTS)		
-54	COML	. SCREW, MACHINE, Binding head, steel, nickel .. plated, No. 6-32 by 3/8 in. lg	1	
		---*---		
-55	811-315	. MIXER STAGE, FREQUENCY, Type M-157 ..... (01113) (See figure 13 for detail breakdown)	1	
		(ATTACHING PARTS)		
-56	COML	. SCREW, MACHINE, Binding head, steel, nickel .. plated, No. 6-32 by 3/8 in. lg	3	
		---*---		
-57	101	. JACK, TIP (83330) (Supplied w/mtg hardware) ...	1	
-58	212-386	. COVER, Amplifier (01113)	1	
		(ATTACHING PARTS)		
-59	COML	. SCREW, TAPPING, THREAD FORMING, Hex .... head, steel, cadmium plated, No. 4 by 3/16 in. lg	4	
-60	811-314	. AMPLIFIER, RADIO FREQUENCY, Type ..... PBA-172 (01113) (See figure 14 for detail breakdown)	1	
		(ATTACHING PARTS)		
-61	COML	. SCREW, MACHINE, Binding head, steel, nickel... plated, No. 6-32 by 3/8 in. lg	4	
-62	COML	. SCREW, MACHINE, Flat head, steel, nickel ..... plated, No. 6-32 by 3/8 in. lg	2	
-63	COML	. WASHER, LOCK, Steel, nickel plated, No. 6	2	
-64	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated, ... No. 6-32	2	
		---*---		
-65	811-313	. GENERATOR, SIGNAL, Type HM-162 (01113).... (See figure 15 for detail breakdown)	1	
		(ATTACHING PARTS)		
-66	COML	. SCREW, TAPPING, THREAD FORMING, Hex .... head, steel, cadmium plated, No. 6 by 1/4 in. lg	2	
-67	COML	. SCREW, MACHINE, Binding head, steel, nickel... plated, No. 6-32 by 3/8 in. lg	2	
		---*---		
-68	212-371	. COVER, Amplifier-oscillator (01113)	1	
		(ATTACHING PARTS)		
-69	COML	. SCREW, TAPPING, THREAD FORMING, Hex .... head, steel, cadmium plated, No. 4 by 3/16 in. lg	4	
		---*---		
-70	811-312	. AMPLIFIER-OSCILLATOR, Type ABM-163 ..... (01113) (See figure 16 for detail breakdown)	1	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		(ATTACHING PARTS)		
2-71	COML	. SCREW, MACHINE, Binding head, steel, nickel plated, No. 6-32 by 3/8 in. lg	2	
-72	COML	. SCREW, MACHINE, Flat head, steel, nickel plated, No. 6-32 by 3/8 in. lg	2	
-73	COML	. WASHER, LOCK, Steel, nickel plated, No. 6	2	
-74	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated, No. 6-32	2	
		---*---		
-75	811-310	. DETECTOR, RADIO FREQUENCY, Type AD-159 (01113) (See figure 3 for detail breakdown)	1	
		(ATTACHING PARTS)		
-76	COML	. SCREW, MACHINE, Binding head, steel, nickel. plated, No. 6-32 by 3/8 in. lg	4	
		---*---		
-77	232-188	. NUT, SLEEVE, Steel, cadmium plated, No. 6-32 by 3/4 in. lg (01113)	4	
		(ATTACHING PARTS)		
-78	COML	. SCREW, MACHINE, Binding head, steel, nickel. plated, No. 6-32 by 3/8 in. lg	4	
-79	COML	. WASHER, LOCK, Steel, nickel plated, No. 6	4	
		---*---		
-80	659-116	. CABLE ASSEMBLY, POWER, ELECTRICAL (01113)	1	
-81	SR6P	. BUSHING, STRAIN RELIEF, CABLE (28520)	1	
-82	214-326	. PROTECTOR, ELECTRICAL CABLE (01113)	1	
		(ATTACHING PARTS)		
-83	COML	. SCREW, MACHINE, Flat head, steel, nickel plated, No. 6-32 by 3/8 in. lg	1	
		---*---		
-84	811-307	. POWER SUPPLY (01113) (See figure 17 for detail breakdown)	1	
		(ATTACHING PARTS)		
-85	COML	. SCREW, MACHINE, Binding head, steel, nickel plated, No. 8-32 by 3/8 in. lg	5	
-86	COML	. SCREW, MACHINE, Flat head, steel, nickel plated, No. 8-32 by 1/2 in. lg	4	
-87	COML	. WASHER, LOCK, Steel, nickel plated, No. 8	4	
-88	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated, No. 8-32	4	
		---*---		
-89	841	. CLAMP, LOOP (83330)	1	
2-	1000-116	. WIRING HARNESS, BRANCHED (01113)	1	
-90	UG-88/U	. . CONNECTOR, PLUG ELECTRICAL, 1 contact (02660)	1	
-91	31-206	. . PLUG, TIP (02660)	2	
-92	1000-117	. RACK, ELECTRICAL EQUIPMENT (01113)	1	
3-	822-048	DETECTOR, RADIO FREQUENCY Type D-50 (01113) (See figure 2-4 for next higher assembly)	Ref	F
3	811-310	DETECTOR, RADIO FREQUENCY, Type AD-159 (01113) (See figure 2-75 for next higher assembly)	Ref	G
-1	TR53	. DUMMY LOAD, ELECTRICAL (01113)	1	G
-2	222-116	. COVER PLATE, ACCESS (01113)	1	



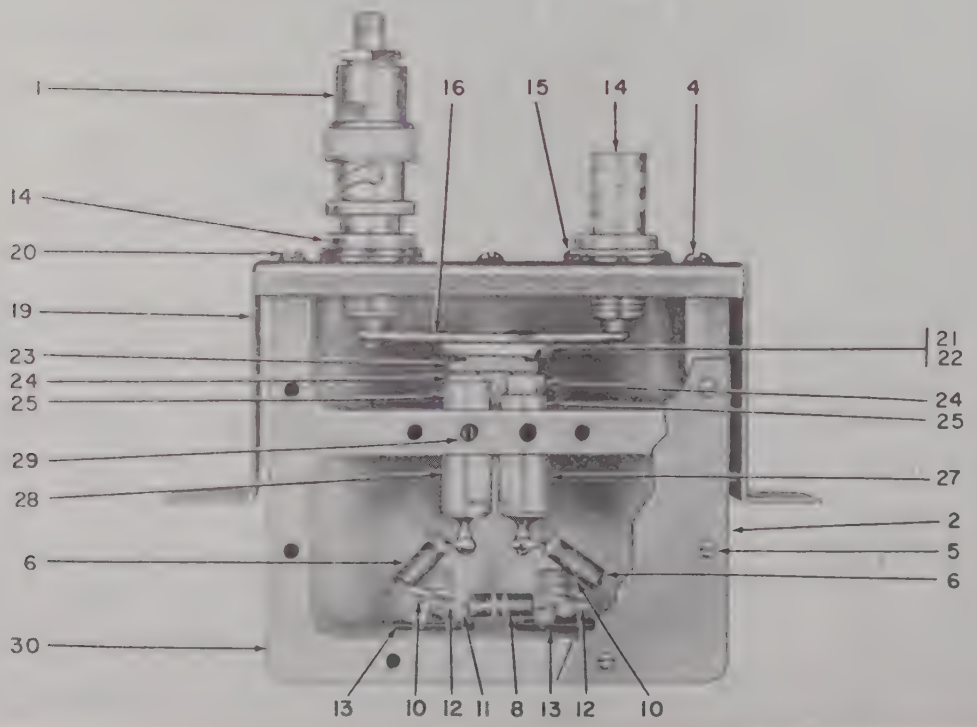


Figure 3. Radio Frequency Detector, Type D-50 and AD-159

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		(ATTACHING PARTS)		
3-3	COML	. SCREW, MACHINE, Button head, steel, nickel plated, No. 4-40 by 5/16 in. lg	3	F
-4	COML	. SCREW, MACHINE, Round head, steel, nickel plated, No. 4-40 by 3/16 in. lg	3	G
-5	COML	. SCREW, MACHINE, Filister head, steel, nickel plated, No. 4-40 by 3/8 in. lg	8	
		---*---		
-6	EB3015	. RESISTOR, FIXED, COMPOSITION, 300 ohms ±5 pct, 1/2 w (01121)	2	
-7	EB2241	. RESISTOR, FIXED, COMPOSITION, 220,000 ohms ±10 pct. 1/2 w (01121)	1	F
-8	EB1011	. RESISTOR, FIXED, COMPOSITION, 100 ohms ±10 pct, 1/2 w (01121)	1	G
-9	101	. JACK, TIP (83330) (Supplied w/mtg hardware	2	F
-10	221-110	. JACK, TIP (01113)	2	G
		(ATTACHING PARTS)		
-11	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated, 1/4-32	2	G
		---*---		
-12	1496	. TERMINAL, LUG (83330)	2	
-13	753-109	. INSULATOR, WASHER (01113)	4	
-14	UG-657/U	. CONNECTOR, RECEPTACLE, ELECTRICAL, 1 contact (02660) (Supplied w/mtg hardware)	2	
		(ATTACHING PARTS)		
-15	COML	. WASHER, FLAT, Steel, nickel plated, 3/8 in. id, 5/8 in. od, 1/32 in. thk	4	G
		---*---		
-16	218-008	. TERMINAL, LUG (01113)	1	
-17	810-247	. PANEL, Detector (01113)	1	F
-18	COML	. SCREW, MACHINE, Button head, steel, nickel plated, No. 4-40 by 5/16 in. lg	5	F
		---*---		
-19	214-092	. BRACKET, Mounting, detector (01113)	1	G
		(ATTACHING PARTS)		
-20	COML	. SCREW, MACHINE, Round head, steel, nickel plated, No. 4-40 by 1/4 in. lg	5	G
		---*---		
-21	4700CH	. CAPACITOR, FIXED, MICA DIELECTRIC, 1000 uuf ±2 pct, 500 vdcw (72982)	1	
		(ATTACHING PARTS)		
-22	COML	. SCREW, MACHINE, Round head, steel, nickel plated, No. 2-56 by 3/16 in. lg	1	
		---*---		
-23	222-115	. HOLDER, SEMICONDUCTOR DEVICE (01113)	1	
-24	139-106	. SEMICONDUCTOR DEVICE, DIODE (01113)	2	
-25	229-118	. TUNING Barrel (01113)	2	
-26	1000-106	. CAPACITOR ASSEMBLY, 47 uuf ± 10 pct, 500 vdcw (01113)	1	F
-27	1000-105	. CAPACITOR ASSEMBLY, 1000 uuf ± 10 pct, 500 vdcw (01113)	1	G
-28	1000-106	. CAPACITOR ASSEMBLY, 47 uuf ± 10 pct, 500 vdcw (01113)	1	
		(ATTACHING PARTS)		
-29	COML	. SETSCREW, Steel, nickel plated, No. 6-32 by 3/16 in. lg	2	
		---*---		
-30	228-105	. HOUSING, Detector (01113).	1	

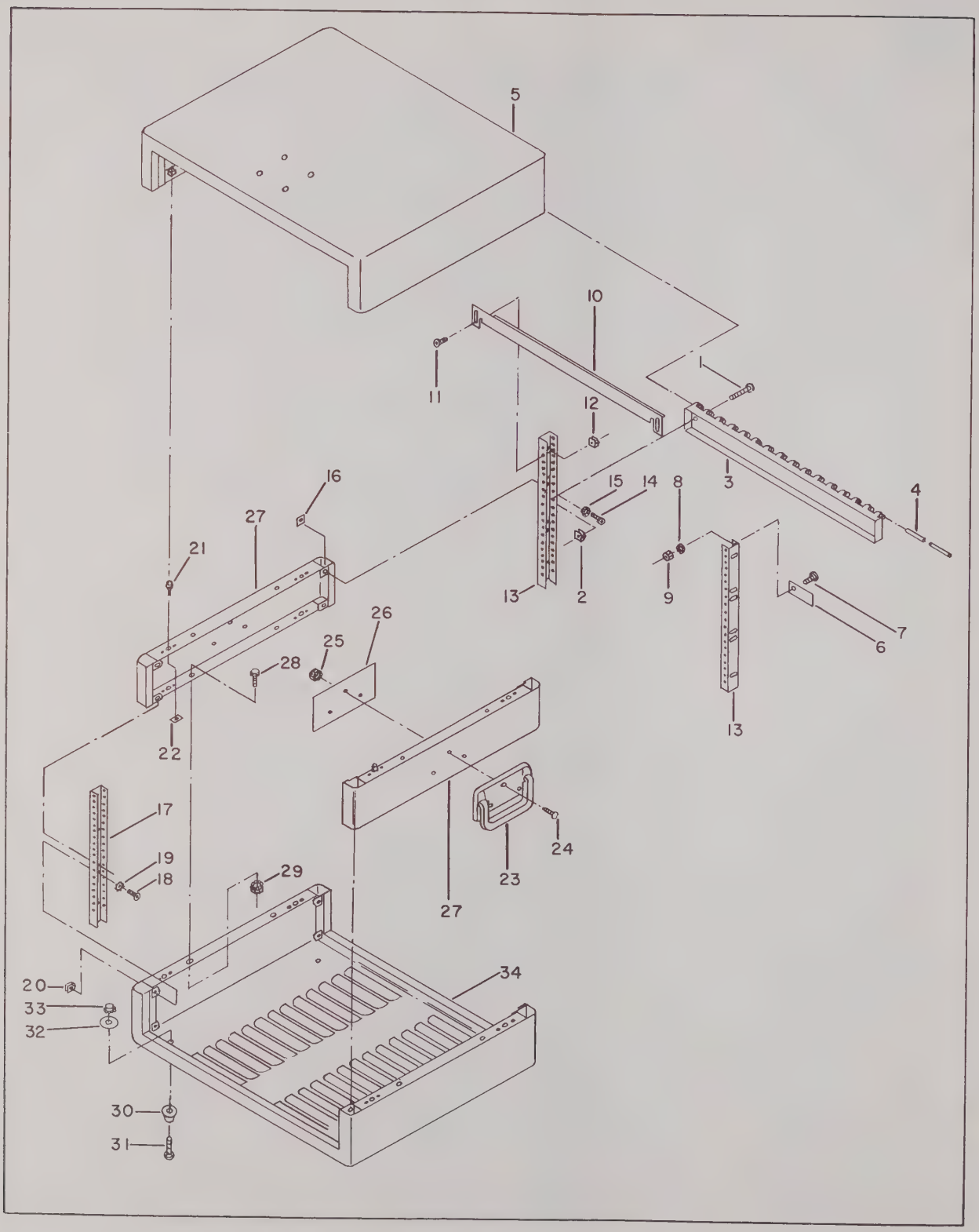


Figure 4. Electrical Equipment Cabinet

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
4-	812-024	CABINET, ELECTRICAL EQUIPMENT (01113)..... (See figure 2-6 for next higher assembly)	Ref	
4-	1001-101	. COVER ASSEMBLY, Top (01113) ..... (ATTACHING PARTS)	1	
-1	COML	. SCREW, ASSEMBLED WASHER, Steel, nickel ... plated, No. 12-24 by 1 in. lg	2	
-2	COML	. NUT, SHEET SPRING, Steel, zinc finish, No. 12 .. ---*---	2	
-3	1001-103	. . LEAF, BUTT HINGE (01113) ..... (ATTACHING PARTS)	1	
-4	1001-104	. . PIN, STRAIGHT, HEADLESS (01113)..... ---*---	1	
-5	1001-102	. . COVER, Top (01113)	1	
-6	1001-108	. PLATE, Stop (01113) ..... (ATTACHING PARTS)	2	
-7	COML	. SCREW, MACHINE, Pan head, steel, cadmium ... plated, No. 12-24 by 1/2 in. lg	2	
-8	COML	. WASHER, LOCK, Steel cadmium plated, No. 12 ..	2	
-9	COML	. NUT, PLAIN, HEXAGON, Steel, cadmium ..... plated, No. 12-24 ---*---	2	
-10	1001-109	. BAR, Support (01113) ..... (ATTACHING PARTS)	2	
-11	COML	. SCREW, ASSEMBLED WASHER, Steel, nickel.... plated, No. 12-24 by 1/2 in. lg	4	
-12	COML	. NUT, SHEET SPRING, Steel, zinc finish, No. 12 .. ---*---	4	
-13	1001-110	. BRACKET, ANGLE (01113) ..... (ATTACHING PARTS)	2	
-14	COML	. SCREW, MACHINE, Pan head, steel, cadmium ... plated, No. 12-24 by 1/2 in. lg	8	
-15	COML	. WASHER, LOCK, Steel, cadmium plated, No. 12 ..	8	
-16	COML	. NUT, SHEET SPRING, Steel, zinc finish, No. 12 .. ---*---	8	
-17	1001-111	. BRACKET, ANGLE (01113) ..... (ATTACHING PARTS)	2	
-18	COML	. SCREW, MACHINE, Pan head, steel, cadmium ... plated, No. 12-24 by 1/2 in. lg	8	
-19	COML	. WASHER, LOCK, Steel, cadmium plated, No. 12 ..	8	
-20	COML	. NUT, SHEET SPRING, Steel, zinc finish, No. 12 .. ---*---	8	
-21	1001-112	. STUD, FRICTION CATCH (01113) ..... (ATTACHING PARTS)	2	
-22	COML	. NUT, SHEET SPRING, Steel, blued finish, No. 4 .. ---*---	2	
-23	1001-105	. HANDLE, BOW (01113) ..... (ATTACHING PARTS)	2	
-24	COML	. SCREW, MACHINE, Button head, steel, ... cadmium plated, No. 10-32 by 1/2 in. lg	6	
-25	COML	. NUT, SELF-LOCKING, HEXAGON, Steel, ... cadmium plated, No. 10-32 ---*---	6	
-26	1001-113	. PLATE, Support (01113)	2	
-27	1001-106	. PANEL, Side (01113)..... (ATTACHING PARTS)	2	
-28	COML	. BOLT, MACHINE, Hex head, steel, cadmium..... plated, 1/4-20 by 1/2 in. lg	4	
-29	COML	. NUT, SELF-LOCKING, HEXAGON, Steel,..... cadmium plated, 1/4-20 ---*---	4	
-30	1001-114	. BUMPER, RUBBER (01113)	4	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		(ATTACHING PARTS)		
4-31	COML	. SCREW, MACHINE, Pan head, steel, cadmium ... plated, No. 12-24 by 3/4 in. lg	4	
-32	COML	. WASHER, FLAT, Steel, cadmium plated, 1/4 in... id by 1-1/2 in. od by 1/16 in. thk	4	
-33	COML	. NUT, SELF-LOCKING, HEXAGON, Steel, ... cadmium plated, No. 12-24	4	
		---*---		
-34	1001-107	. BASE, Cabinet (01113)	1	
5-	811-308	PANEL, TEST, ELECTRICAL (01113) (See ..... figure 2-35 for next higher assembly	Ref	
-1	239-024	. KNOB (01113) (Supplied w/mtg hardware)	10	
-2	239-026	. KNOB (01113) (Supplied w/mtg hardware)	1	
-3	239-030	. KNOB (01113) (Supplied w/mtg hardware)	1	
-4	239-034	. KNOB (01113) (Supplied w/mtg hardware)	1	
-5	107-004	. ATTENUATOR, VARIABLE (01113) (Supplied .... w/mtg hardware)	1	
-6	822-042	. SWITCH, RADIO FREQUENCY TRANSMISSION .. LINE (01113) (See figure 6 for detail breakdown)	1	
		(ATTACHING PARTS)		
-7	COML	. SCREW, MACHINE, Flat head, steel, nickel..... plated, No. 6-32 by 3/8 in. lg	2	
	COML	. WASHER, LOCK, Steel, black oxide, 3/8 ID ..... by 1/2 OD by 1/32 in. thk	2	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated, ... 3/8-24	2	
		---*---		
-8	275-012	. PRINTED CIRCUIT BOARD (01113).....	1	
-9	275-011	. PRINTED CIRCUIT BOARD (01113).....	1	
		(ATTACHING PARTS)		
-10	COML	. SCREW, MACHINE, Round head, steel, nickel.... plated, No. 4-40 by 1/4 in. lg	4	
5-	RPN4-40-5C	. NUT, PLAIN, SPLINE, Steel, cadmium plated, ... No. 4-40 (83324)	4	
		---*---		
-11	GE2P	. LAMP, GLOW (24455).....	8	
-12	232-086	. SHIELD, Light (01113).....	2	
-13	231-143	. PLATE, DESIGNATION (01113)	2	
-14	215-148	. CLAMP, RIM CLENCHING (01113)	2	
		(ATTACHING PARTS)		
-15	COML	. SCREW, TAPPING, THREAD FORMING, Round .. head, steel, nickel plated, No. 4 by 3/16 in. lg	4	
		---*---		
-16	237-003	. WINDOW, DIAL (01113).....	1	
-17	232-088	. VERNIER, Dial window (01113).....	1	
-18	232-087	. BEZEL, Window (01113).....	1	
		(ATTACHING PARTS)		
-19	COML	. SCREW, MACHINE, Filister head, steel, nickel .. plated, No. 6-32 by 1/2 in. lg	4	
		---*---		
-20	214-298	. BRACKET, ANGLE (01113)	2	
-21	MM2-100MA	. VOLTMETER (40931) (Supplied w/mtg hardware).	1	
5-	1000-111	. CABLE ASSEMBLY, SPECIAL PURPOSE, ... ELECTRICAL (01113)	1	
-22	M61	. . CONNECTOR, PLUG, ELECTRICAL, ... 6 contacts (75173)	1	

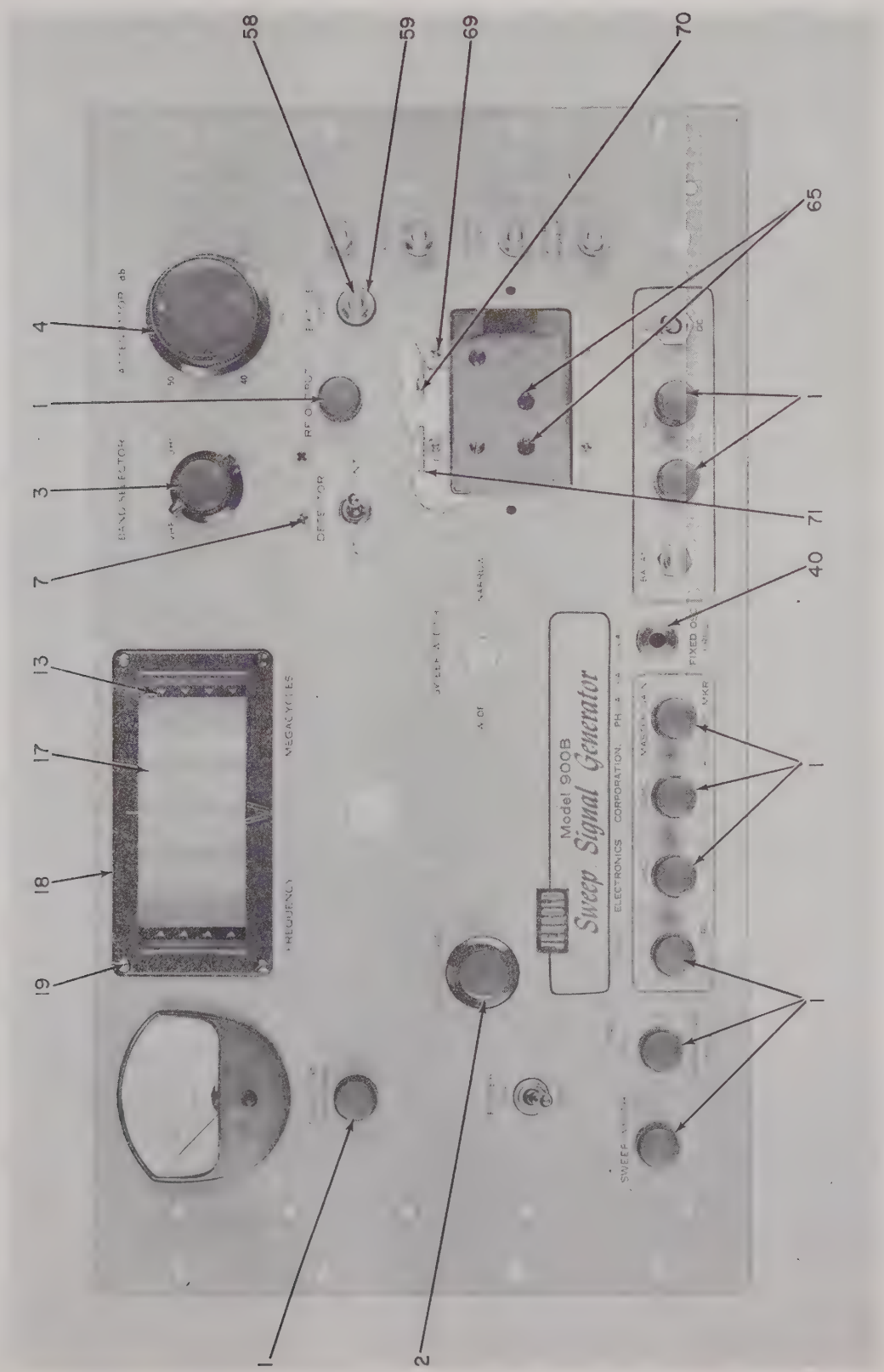


Figure 5. Electrical Test Panel (Sheet 1 of 2)

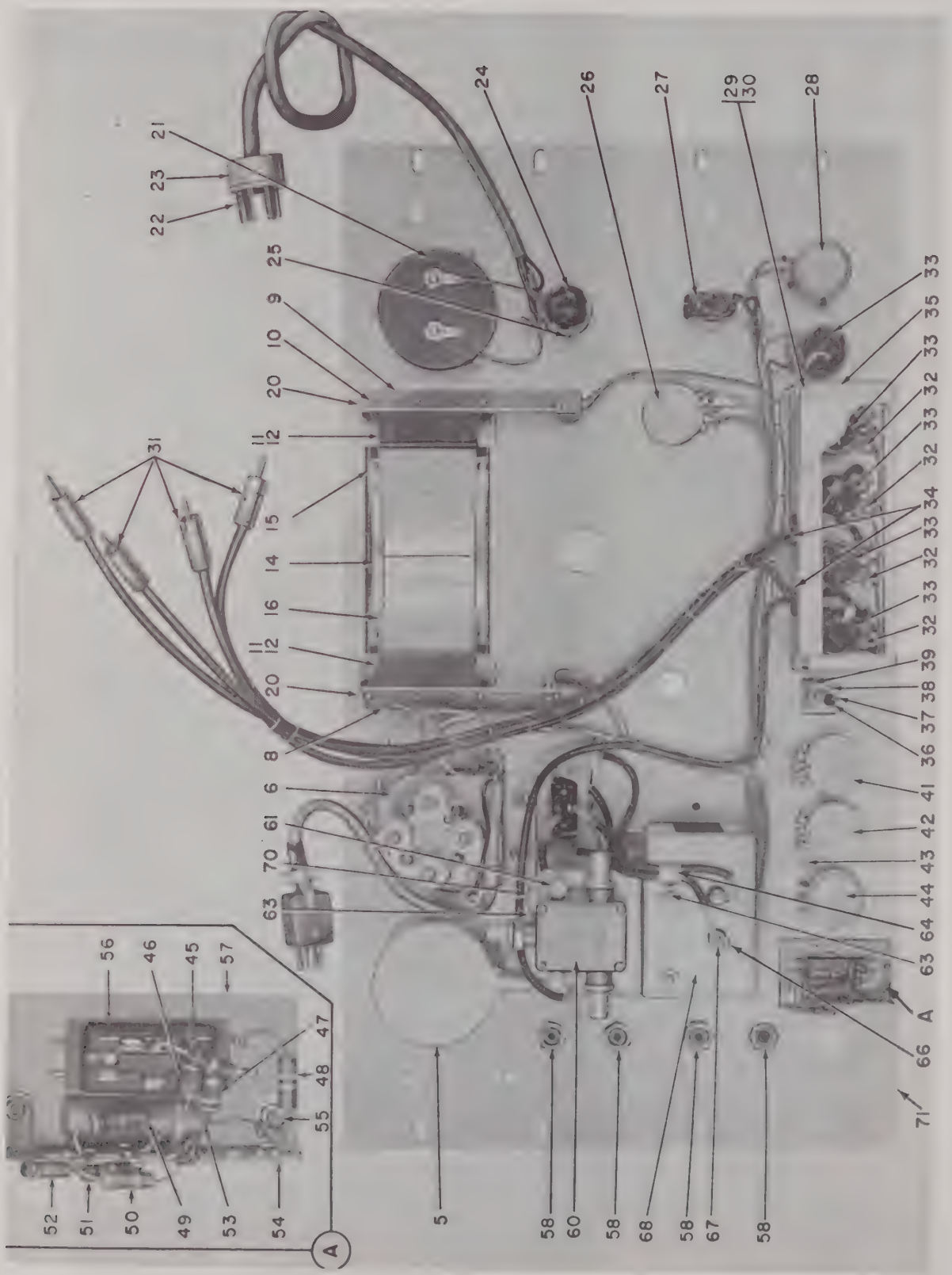


Figure 5. Electrical Test Panel (Sheet 2 of 2)

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-23	12358	. . SHELL, ELECTRICAL CONNECTOR..... (75173)	1	
-24	118-085	. RESISTOR, VARIABLE, 0 to 50,000 ohms ..... ± 30 pct, 1/2 w (01113) (Supplied w/mtg hardware)	1	
-25	701-022	. TERMINAL, LUG (01113).....	8	
-26	118-084	. RESISTOR, VARIABLE, 0 to 100 ohms ± 30 pct, .. 2 w (01113) (Supplied w/mtg hardware)	1	
-27	T110B63	. SWITCH, TOGGLE, SPST (73559) (Supplied ..... w/mtg hardware)	1	
-28	JA2N056P104AA	. RESISTOR, VARIABLE, 0 to 100,000 ohms ..... ± 30 pct, 2 w (01121) (Supplied w/mtg hardware)	1	
-29	212-382	. COVER, Resistor (01113)..... (ATTACHING PARTS)	1	
-30	COML	. SCREW, TAPPING, THREAD FORMING, Hex .... head, steel, cadmium plated, No. 4 by 3/16 in. lg ---*---	4	
5-	1000-110	. CABLE ASSEMBLY, RADIO FREQUENCY, ... BRANCHED	1	
-31	3502	. . PLUG, TIP (82389).....	4	
-32	331000U2M331J	. CAPACITOR, FIXED, CERAMIC DIELECTRIC, .. 330 uuf ± 5 pct, 200 vdcw (72982)	4	
-33	118-047	. RESISTOR, VARIABLE, 0 to 100,000 ohms ..... ± 30 pct, 1/2 w (01113) (Supplied w/mtg hardware)	5	
-34	294-004	. GROMMET, RUBBER (01113)	2	
-35	211-164	. HOUSING, Resistor (01113)	1	
-36	229-125	. TUBE, Guide (01113) ..... (ATTACHING PARTS)	1	
-37	COML	. SETSCREW, Steel, nickel plated, No. 6-32 by .... by 3/16 in. lg ---*---	1	
-38	221-202	. BUSHING, Guide tube (01113)..... (ATTACHING PARTS)	1	
-39	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated, ... 3/8-24	1	
	CA10002	. WASHER, SPRING TENSION (94603) ..... ---*---	1	
-40	273-013	. SLEEVE, Panel (01113)	1	
-41	118-081	. RESISTOR, VARIABLE, 0 to 100,000 ohms ..... ± 30 pct, 1/2 w (01113) (Supplied w/mtg hardware)	1	
-42	118-080	. RESISTOR, VARIABLE, 0 to 25,000 ohms ..... ± 30 pct, 1 w (01113) (Supplied w/mtg hardware)	1	
-43	701-047	. TERMINAL, LUG (01113).....	1	
-44	J82182	. RESISTOR, VARIABLE, 0 to 500,000 ohms ..... ± 30 pct, 2 w (01121) (Supplied w/mtg hardware)	1	
-45	EB5651	. RESISTOR, FIXED, COMPOSITION, ... 5.6 meg ± 10 pct, 1/2 w (01121)	1	
-46	EB1851	. RESISTOR, FIXED, COMPOSITION, ... 1.8 meg ± 10 pct, 1/2 w (01121)	1	
-47	EB3351	. RESISTOR, FIXED, COMPOSITION,..... 3.3 meg ± 10 pct, 1/2 w (01121)	1	
-48	EB5641	. RESISTOR, FIXED, COMPOSITION,..... 560,000 ohms ± 10 pct, 1/2 w (01121)	1	
-49	EB3055	. RESISTOR, FIXED, COMPOSITION, ... 3.0 meg ± 5 pct, 1/2 w (01121)	1	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-50	EB1061	. RESISTOR, FIXED, COMPOSITION, ... 10.0 meg ±10 pct, 1/2 w (01121)	1	
-51	EB4751	. RESISTOR, FIXED, COMPOSITION, ... 4.7 meg ±10 pct, 1/2 w (01121)	1	
-52	EB1345	. RESISTOR, FIXED, COMPOSITION,..... 130,000 ohms ±5 pct, 1/2 w (01121)	1	
-53	P88N2000MMF 200-5	. CAPACITOR, FIXED, PAPER DIELECTRIC, ... 2000 uuf ±5 pct, 200 vdcw (00656)	1	
-54	234-427	. TERMINAL BOARD (01113)	1	
-55	COML	. RIVET, TUBULAR	2	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 5	2	
		---*---		
-56	316-63	. SWITCH, TOGGLE, DPDT (73559) (Supplied .... w/mtg hardware)	2	
-57	213-342	. PLATE, Switch (01113).....	1	
-58	UG-657/U	. CONNECTOR, RECEPTACLE, ELECTRICAL, .. 1 contact (02660) (Supplied w/mtg hardware)	5	
		(ATTACHING PARTS)		
-59	2153	. WASHER, NONMETALLIC (83330).....	2	
		---*---		
-60	811-315	. MIXER STAGE, FREQUENCY (01113) (See ..... figure 7 for detail breakdown)	1	
		(ATTACHING PARTS)		
-61	COML	. SCREW, MACHINE, Binding head, steel, ... cadmium plated, No. 6-32 by 1/2 in. lg	2	
		---*---		
-62	214-318	. BRACKET, DOUBLE ANGLE (01113)	1	
		(ATTACHING PARTS)		
-63	COML	. SCREW, MACHINE, Binding head, steel, nickel.. plated, No. 6-32 by 3/8 in. lg	2	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 6	2	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel ..... plated, No. 6-32	2	
		---*---		
-64	78	. STRAP, RETAINING (79963)	1	
-65	102	. JACK, TIP (83330) (Supplied w/mtg hardware) ..	2	
-66	701-008	. TERMINAL, LUG (01113).....	2	
-67	2162	. WASHER, NONMETALLIC (83330)	2	
-68	214-090	. BRACKET, DOUBLE ANGLE (01113)	1	
		(ATTACHING PARTS)		
-69	COML	. SCREW, MACHINE, Flat head, steel, nickel..... plated, No. 6-32 by 3/8 in. lg	4	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel ..... plated, No. 6-32	2	
		---*---		
-70	1000-108	. TERMINAL BOARD (01113)	1	
-71	1000-109	. TERMINAL BOARD (01113)	1	
-72	118-082	. RESISTOR, VARIABLE, 0 to 5000 ohms ..... ±30 pct, 1/2 w (01113)	1	
-73	216-134	. PANEL (01113)	1	

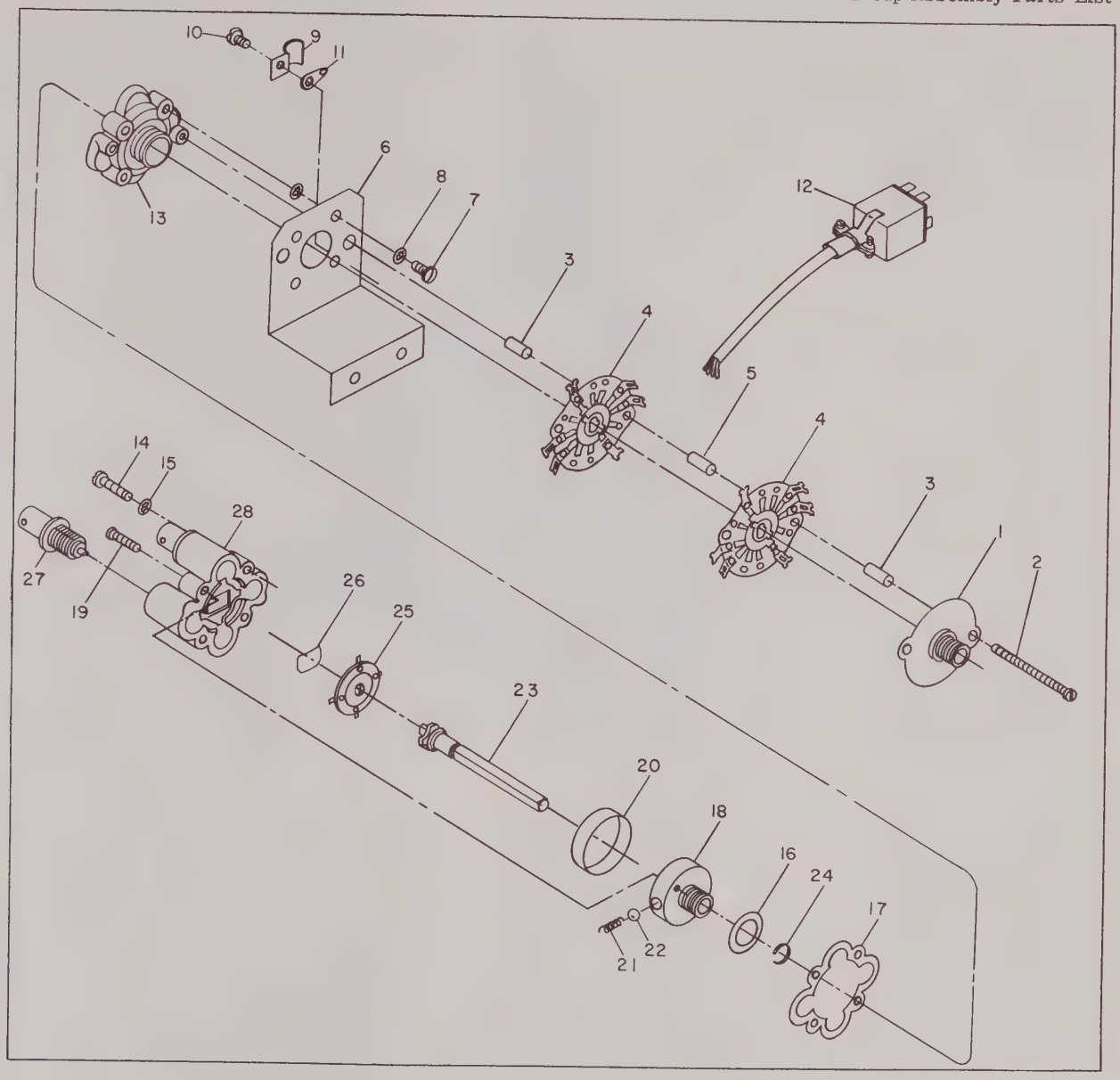


Figure 6. Radio Frequency Transmission Line Switch

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
6-	822-042	SWITCH, RADIO FREQUENCY TRANSMISSION .... LINE (01113) (See figure 5-6 for next higher assembly)	Ref	
-1	273-005	. SHIELD, ROTARY SWITCH (01113) ..... (ATTACHING PARTS)	1	
-2	COML	. SCREW, MACHINE, Round head, steel, ... cadmium plated, No. 5-40 by 1-5/8 in. lg	2	
		---*---		

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
6-3	273-003	. SPACER, SLEEVE (01113)	4	
-4	PS283-233	. SWITCH SECTION, ROTARY (71590)	2	
-5	273-004	. SPACER, SLEEVE (01113).....	2	
-6	214-299	. BRACKET, DOUBLE ANGLE (01113) ..... (ATTACHING PARTS)	1	
-7	COML	. SCREW, MACHINE, Binding head, steel, nickel.. plated, No. 6-32 by 1/4 in. lg	4	
-8	COML	. WASHER, LOCK, Steel, nickel plated, No. 6 .... ---*---	8	
-9	78	. STRAP, RETAINING (79963) ..... (ATTACHING PARTS)	1	
-10	COML	. SCREW, TAPPING, THREAD FORMING, ... Hex head, steel, nickel plated, No. 6 by 1/4 in. lg ---*---	1	
-11	2106-06-00	. TERMINAL, LUG (78189)	1	
-12	P304CCT	. CONNECTOR, PLUG, ELECTRICAL, ... 4 contacts (75173)	1	
-13	222-125	. COVER, Switch (01113) ..... (ATTACHING PARTS)	1	
-14	COML	. SCREW, MACHINE, Round head, steel, nickel... plated, No. 6-32 by 5/8 in. lg	4	
-15	COML	. WASHER, LOCK, Steel, nickel plated, No. 6 .... ---*---	4	
-16	750-009	. WASHER, SPRING TENSION (01113)	1	
-17	752-018	. GASKET SHIELD, ELECTRICAL (01113)	1	
-18	218-011	. RETAINER, Detent ball (01113)..... (ATTACHING PARTS)	1	
-19	COML	. SCREW, MACHINE, Pan head, brass, No. 2-56.. by 9/16 in. lg ---*---	2	
-20	229-108	. RING, Spring retainer (01113).....	1	
-21	224-010	. SPRING, HELICAL, COMPRESSION (01113).....	2	
-22	220-007	. BALL, BEARING (01113)	2	
-23	811-247	. SHAFT AND CAM ASSEMBLY (01113) ..... (ATTACHING PARTS)	1	
-24	COML	. RING, RETAINING ..... ---*---	1	
-25	216562A	. SWITCH SECTION, ROTARY (76854)	1	
-26	224-011	. PLATE, Spring (01113)	1	
-27	UG-657/U	. CONNECTOR, RECEPTACLE, ELECTRICAL, .. 1 contact (02660)	4	
-28	222-124	. HOUSING, Switch (01113)	1	

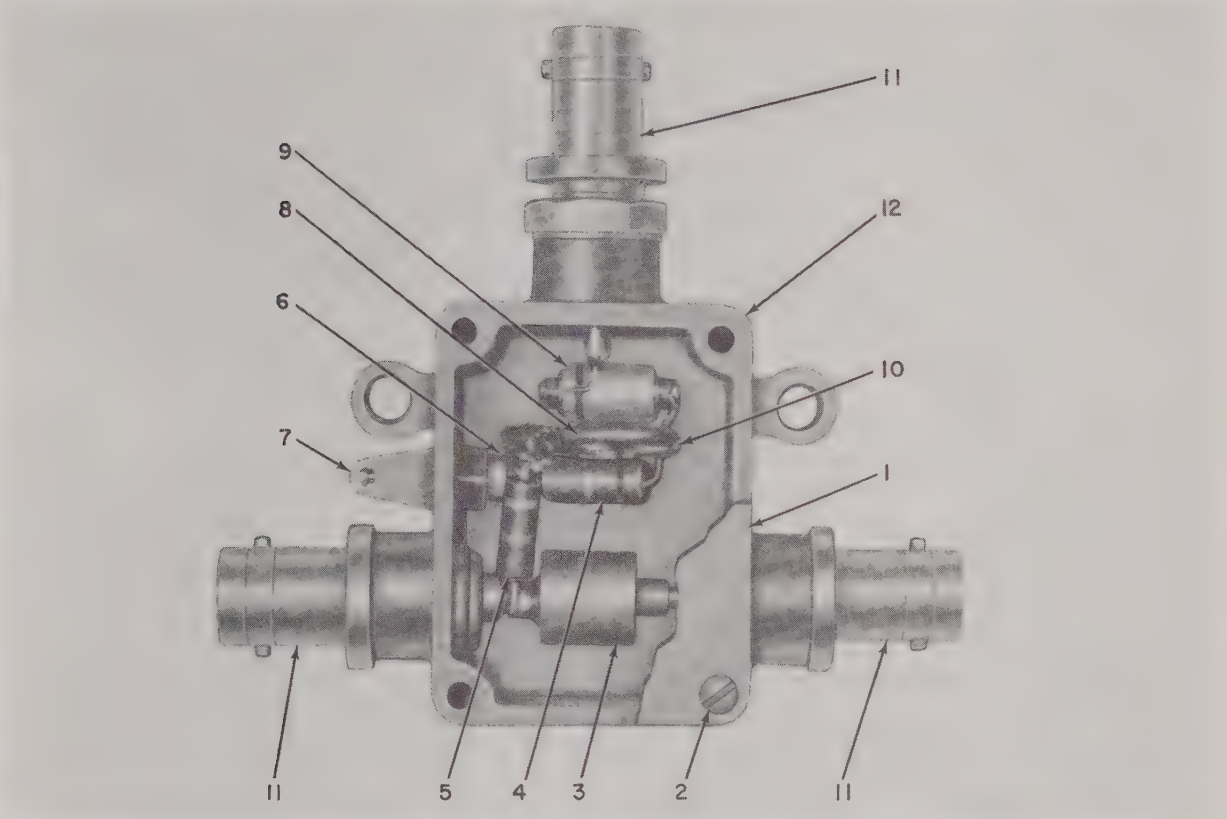


Figure 7. Frequency Mixer Stage

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
7-	811-315	MIXER STAGE, FREQUENCY (01113) (See figure 5-60 for next higher assembly)	Ref	
-1	228-123	. COVER PLATE, ACCESS (01113) (ATTACHING PARTS)	1	
-2	COML	. SCREW, MACHINE, Round head, steel, nickel plated, No. 4-40 by 1/4 in. lg ---*---	4	
-3	221-201	. COIL, RADIO FREQUENCY (01113)	1	
-4	EB1021	. RESISTOR, FIXED, COMPOSITION, 1000 ohms ± 10 pct, 1/2 w (01121)	1	
-5	EB5621	. RESISTOR, FIXED, COMPOSITION, 5600 ohms ± 10 pct, 1/2 w (01121)	1	
-6	69001-0500	. CAPACITOR, FIXED, PLASTIC DIELECTRIC, 1.8 uuf ± 10 pct, 500 vdcw (03187) (Supplied w/mtg hardware)	1	
-7	701-008	. TERMINAL, LUG (01113)	1	
-8	331000U2M250K	. CAPACITOR, FIXED, CERAMIC DIELECTRIC, 25 uuf ± 10 pct, 500 vdcw (72982)	1	
-9	139-102	. SEMICONDUCTOR DEVICE, DIODE (01113)	1	
-10	234-473	. TERMINAL BOARD (01113)	1	
-11	UG-657/U	. CONNECTOR, RECEPTACLE, ELECTRICAL, 1 contact (02660)	3	
-12	222-151	. HOUSING, Mixer (01113)	1	

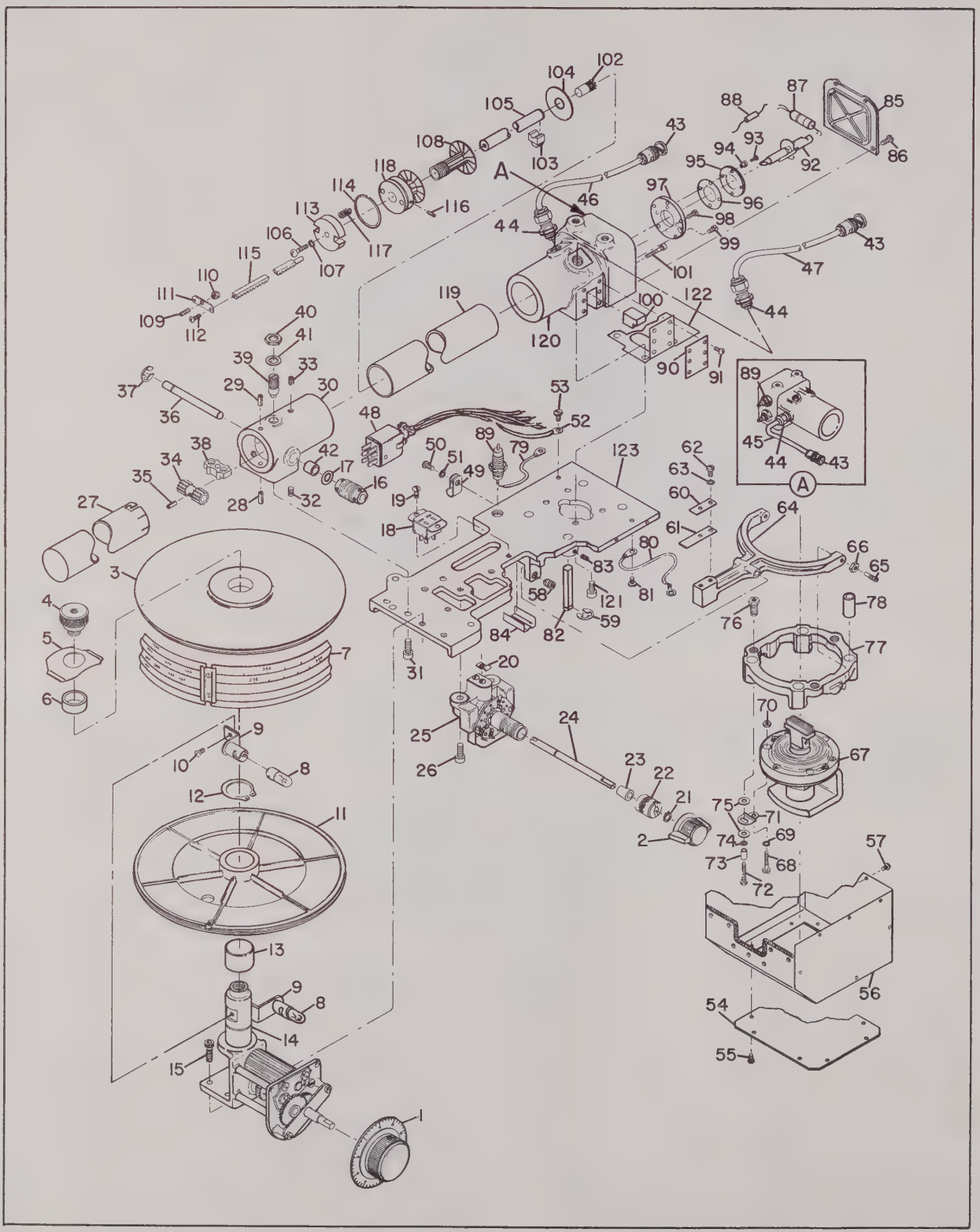


Figure 8. Sweep Generator Subassembly, Type 900B

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
8-	815-124	SWEEP GENERATOR SUBASSEMBLY, Type 900B .. (01113) (See figure 2-37 for next higher assembly)	Ref	
-1	239-021	. KNOB (01113) (Supplied w/mtg hardware)	1	
-2	239-030	. KNOB (01113) (Supplied w/mtg hardware)	1	
-3	228-139	. DISK, Dial (01113) ..... (ATTACHING PARTS)	1	
-4	221-187	. SCREW, Special (01113)	1	
-5	224-033	. WASHER, SPRING TENSION (01113) ..... ---*---	1	
-6	273-012	. BEARING, SLEEVE (01113)	1	
-7	219-231	. DIAL, SCALE (01113)	1	
-8	47	. LAMP, INCANDESCENT (24455)	2	
-9	102-501	. LAMPHOLDER (01113)..... (ATTACHING PARTS)	2	
-10	COML	. SCREW, MACHINE, Round head, steel, nickel... plated, No. 2-56 by 1/4 in. lg ---*---	2	
-11	278-021	. GEAR, Spiral, rack (01113) ..... (ATTACHING PARTS)	1	
-12	5100-100	. RING, RETAINING (79136) ..... ---*---	1	
-13	AA1110-10	. BEARING, SLEEVE (70417)	1	
-14	811-259	. GEAR ASSEMBLY, SPEED DECREASER ..... (01113) (See figure 9 for detail breakdown) (ATTACHING PARTS)	1	
-15	COML	. SCREW, CAP, SOCKET HEAD, Filister head,... cres, passivate finish, No. 10-32 by 3/8 in. lg ---*---	3	
-16	205-007	. COUPLING, SHAFT, FLEXIBLE (01113) ..... (Supplied w/mtg hardware)	1	
-17	754-005	. WASHER, SPRING TENSION (01113)	1	
-18	184-018	. CONNECTOR, RECEPTACLE, ELECTRICAL, .. 4 contacts (01113) (ATTACHING PARTS)	1	
-19	COML	. SCREW, MACHINE, Binding head, steel, nickel . plated, No. 6-32 by 1/4 in. lg ---*---	2	
-20	1065	. STRAP, RETAINING (75173)	1	
8-	811-233	. COUPLING AND SHAFT ASSEMBLY (01113)....	1	
-21	773-109-1	. . RING, RETAINING (01113).....	1	
-22	221-219	. . NUT, ROUND, KNURLED, Aluminum, ... anodized finish, 9/10-12 (01113)	1	
-23	221-220	. . BUSHING, SLEEVE (01113)	1	
-24	226-021	. . SHAFT, SHOULDERED (01113)	1	
-25	811-239	. DETENT SWITCH ASSEMBLY (01113) (See ..... figure 10 for detail breakdown) (ATTACHING PARTS)	1	
-26	COML	. SCREW, CAP, SOCKET HEAD, Filister head,... cres, passivate finish, No. 10-32 by 3/8 in. lg ---*---	2	
-27	229-110	. COVER, Rack (01113) ..... (ATTACHING PARTS)	1	
-28	COML	. PIN, SPRING, 1/8 by 1/2 in. lg	1	
-29	COML	. PIN, SPRING, 1/8 by 3/8 in. lg..... ---*---	1	
-30	221-135	. HOUSING, Rear (01113)	1	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		(ATTACHING PARTS)		
8-31	COML	. SCREW, CAP, SOCKET HEAD, FIlister head, ... cres, passivate finish, No. 10-32 by 3/8 in. lg	3	
-32	COML	. SETSCREW, Cres, passivate finish, No. 8-32 ... by 5/16 in. lg	1	
-33	COML	. SETSCREW, Steel, black oxide, No. 8-32 by .... 3/16 in. lg	1	
		---*---		
-34	278-019	. GEAR CLUSTER, SPUR (01113)	1	
		(ATTACHING PARTS)		
-35	COML	. PIN, SPRING 3/32 x 3/8 in. lg	1	
		---*---		
-36	226-019	. SHAFT, STRAIGHT (01113)	1	
		(ATTACHING PARTS)		
-37	5133-25	. RING, RETAINING (79136)	1	
		---*---		
-38	232-073	. RACK SUPPORT (01113)	1	
-39	221-190	. BOLT, Special (01113)	1	
-40	COML	. NUT, PLAIN, HEXAGON, Cres, passivate ..... finish, 3/8-24	1	
-41	1000-118	. WASHER, SPRING TENSION (01113)	1	
-42	304-7	. BEARING, SLEEVE (70417)	2	
8-	659-109	. CABLE ASSEMBLY, RADIO FREQUENCY ..... (01113)	1	H
8-	659-121	. CABLE ASSEMBLY, RADIO FREQUENCY ..... (01113)	1	J
8-	659-122	. CABLE ASSEMBLY, RADIO FREQUENCY..... (01113)	1	K
-43	UG-88/U	. . CONNECTOR, PLUG, ELECTRICAL, ... 1 contact (02660)	1	
-44	1000-113	. . PROBE, WAVEGUIDE (01113).....	1	
-45	RG-55A/U	. . CABLE, RADIO FREQUENCY, 6-3/4 in. lg .. (81349)	1	H
-46	RG-55A/U	. . CABLE, RADIO FREQUENCY, 12-1/4 in. ... lg (81349)	1	J
-47	RG-55A/U	. . CABLE, RADIO FREQUENCY, 6-1/2 in. lg .. (81349)	1	K
8-	659-126	. CABLE ASSEMBLY, SPECIAL PURPOSE, ... ELECTRICAL (01113)	1	
-48	P306CCT	. . CONNECTOR, PLUG, ELECTRICAL, ... 6 contacts (75173)	1	
-49	C4886-4A	. CLAMP, LOOP (89032)	1	
		(ATTACHING PARTS)		
-50	COML	. SCREW, MACHINE, Round head, steel, ... nickel plated, No. 4-40 by 3/8 in. lg	1	
-51	COML	. WASHER, LOCK, Steel, nickel plated, No. 4	1	
		---*---		
-52	701-003	. TERMINAL, LUG (01113)	1	
		(ATTACHING PARTS)		
-53	COML	. SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 6-32 by 1/4 in. lg	1	
		---*---		
-54	213-337	. COVER PLATE, ACCESS (01113).....	1	
		(ATTACHING PARTS)		
-55	COML	. SCREW, TAPPING, THREAD FORMING, Round.. head, steel, nickel plated, No. 4-40 by 3/16 in. lg	8	
		---*---		
-56	811-236	. COVER, Wobbulator (01113)	1	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
8-		(ATTACHING PARTS)		
-57	COML	. SCREW, TAPPING, THREAD FORMING, ... Round head, steel, nickel plated, No. 4-40 by 3/16 in. lg	7	
		---*---		
8-	1000-119	. WOBBULATOR ASSEMBLY (01113) ..... (ATTACHING PARTS)	1	
-58	COML	. SETSCREW, Self-locking, steel, black oxide, ... 1/4-28 by 3/8 in. lg	2	
-59	5133-25	. RING, RETAINING (79136).....	4	
		---*---		
-60	224-030	. . PLATE, Spring (01113).....	2	
-61	224-031	. . PLATE, Spring (01113)..... (ATTACHING PARTS)	2	
-62	COML	. . SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 6-32 by 1/4 in. lg	4	
-63	COML	. . WASHER, LOCK, Steel, nickel plated, No. 6..	4	
		---*---		
-64	228-133	. . FORK, Wobbulator (01113) ..... (ATTACHING PARTS)	1	
-65	COML	. . SETSCREW, Steel, nickel plated, No. 10-32.. by 9/16 in. lg	2	
-66	COML	. . NUT, PLAIN, HEXAGON, Steel, nickel ..... plated, No. 10-32	2	
		---*---		
-67	1000-121	. . WOBBULATOR (01113)..... (ATTACHING PARTS)	1	
-68	COML	. . SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 6-32 by 3/4 in. lg	3	
-69	COML	. . WASHER, LOCK, Steel, nickel plated, No. 6..	3	
-70	COML	. . NUT, PLAIN, HEXAGON, Steel, nickel ..... plated, No. 6-32	3	
		---*---		
-71	214-290	. . CLAMP, RIM CLENCHING (01113)..... (ATTACHING PARTS)	3	
-72	COML	. . SCREW, MACHINE, Hex head, steel, nickel.. plated, No. 6-32 by 3/4 in. lg	3	
-73	221-197	. . SPACER, SLEEVE (01113).....	3	
-74	COML	. . WASHER, LOCK, Steel, nickel plated, No. 6..	3	
-75	COML	. . WASHER, FLAT, Steel, nickel plated, No. 6..	6	
		---*---		
-76	730-003-2	. . BUSHING, MACHINE THREAD (01113)	3	
-77	228-132	. . MOUNTING RING, Wobbulator (01113)	1	
-78	273-010	. . BUSHING, SLEEVE (01113)	4	
-79	1000-122	. LEAD, ELECTRICAL (01113)	1	
-80	1000-123	. LEAD, ELECTRICAL (01113) ..... (ATTACHING PARTS)	1	
-81	COML	. SCREW, MACHINE, Binding head, steel,..... plated, No. 6-32 by 1/4 in. lg	1	
		---*---		
-82	226-020	. SHAFT, SHOULDERED (01113)..... (ATTACHING PARTS)	4	
-83	COML	. SETSCREW, Steel, black oxide, No. 8-32 by .... 3/16 in. lg	4	
		---*---		
-84	218-030	. RETAINER, Gasket (01113)	1	
-85	228-131	. COVER PLATE, ACCESS (01113) ..... (ATTACHING PARTS)	1	
-86	COML	. SCREW, MACHINE, Round head, steel, nickel .. plated, No. 4-40 by 3/16 in. lg	4	
		---*---		

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
8-87	1000-124	. COIL, RADIO FREQUENCY (01113)	1	
-88	EB4725	. RESISTOR, FIXED, COMPOSITION, 4700 ohms.. ±5 pct, 1/2 w (01121)	1	
-89	823-018	. FILTER, RADIO INTERFERENCE (01113) ..... (Supplied w/mtg hardware)	3	
-90	212-370	. COVER PLATE, ACCESS (01113) ..... (ATTACHING PARTS)	1	
-91	COML	. SCREW, TAPPING, THREAD FORMING, ... Round head, cres, passivate finish, No. 4-40 by 3/16 in. lg ---*---	6	
-92	815-107	. ELECTRON TUBE (01113) ..... (ATTACHING PARTS)	1	
-93	COML	. SCREW, MACHINE, Round head, steel, nickel... plated, No. 2-56 by 3/16 in. lg	4	
-94	231-125	. INSULATOR, BUSHING (01113)	4	
-95	221-099	. GRID CLAMP (01113) ..... ---*---	1	
-96	238-146	. INSULATOR, GRID CLAMP (01113).....	1	
-97	221-192	. GRID FLANGE (01113) ..... (ATTACHING PARTS)	1	
-98	COML	. SCREW, MACHINE, Filister head, steel, ... nickel plated, No. 4-40 by 1/4 in. lg	4	
-99	COML	. SCREW, MACHINE, Filister head, steel, ... nickel plated, No. 4-40 by 3/16 in. lg ---*---	1	
-100	128-204	. PLATE, CAPACITOR (01113) ..... (ATTACHING PARTS)	1	
-101	COML	. SCREW, CAP, SOCKET HEAD, Filister head,... cres, passivate finish, No. 4-40 by 3/4 in. lg ---*---	2	
8-	811-265	. PISTON, Tuning cavity (01113)	1	
-102	224-020	. . CONTACT, ELECTRICAL (01113)	1	
-103	128-203	. . PLATE, CAPACITOR (01113)	1	
-104	238-148	. . INSULATOR, DISK (01113)	1	
-105	229-124	. . SHAFT, STRAIGHT (01113) ..... (ATTACHING PARTS)	1	
-106	COML	. . SCREW, MACHINE, Round head, steel, ... nickel plated, No. 10-32 by 1/2 in. lg	1	
-107	COML	. . WASHER, LOCK, Steel, nickel plated, No. 10. ---*---	1	
-108	221-095	. . PLATE, CAPACITOR (01113)	1	
-109	COML	. . SETSCREW, Steel, nickel plated, No. 4-40 .. by 5/16 in. lg	1	
-110	COML	. . NUT, SELF-LOCKING, SPLINE, Steel, ... cadmium plated, No. 4-40	1	
-111	232-088	. . PLATE, SPACER (01113) ..... (ATTACHING PARTS)	1	
-112	COML	. . SCREW, MACHINE, Round head, steel,..... nickel plated, No. 2-56 by 3/16 in. lg ---*---	2	
-113	221-096	. . PLATE, RETAINING, SHAFT (01113)	1	
-114	643-015	. . INSULATION SLEEVING, ELECTRICAL .... (01113)	AR	
-115	278-023	. . RACK (01113) ..... (ATTACHING PARTS)	2	
-116	COML	. . PIN, SPRING, 1/16 by 3/16 in. lg ..... ---*---	2	
-117	224-014	. . SPRING, HELICAL, COMPRESSION (01113)..	2	
-118	221-094	. . DISK, CAPACITOR (01113)	1	

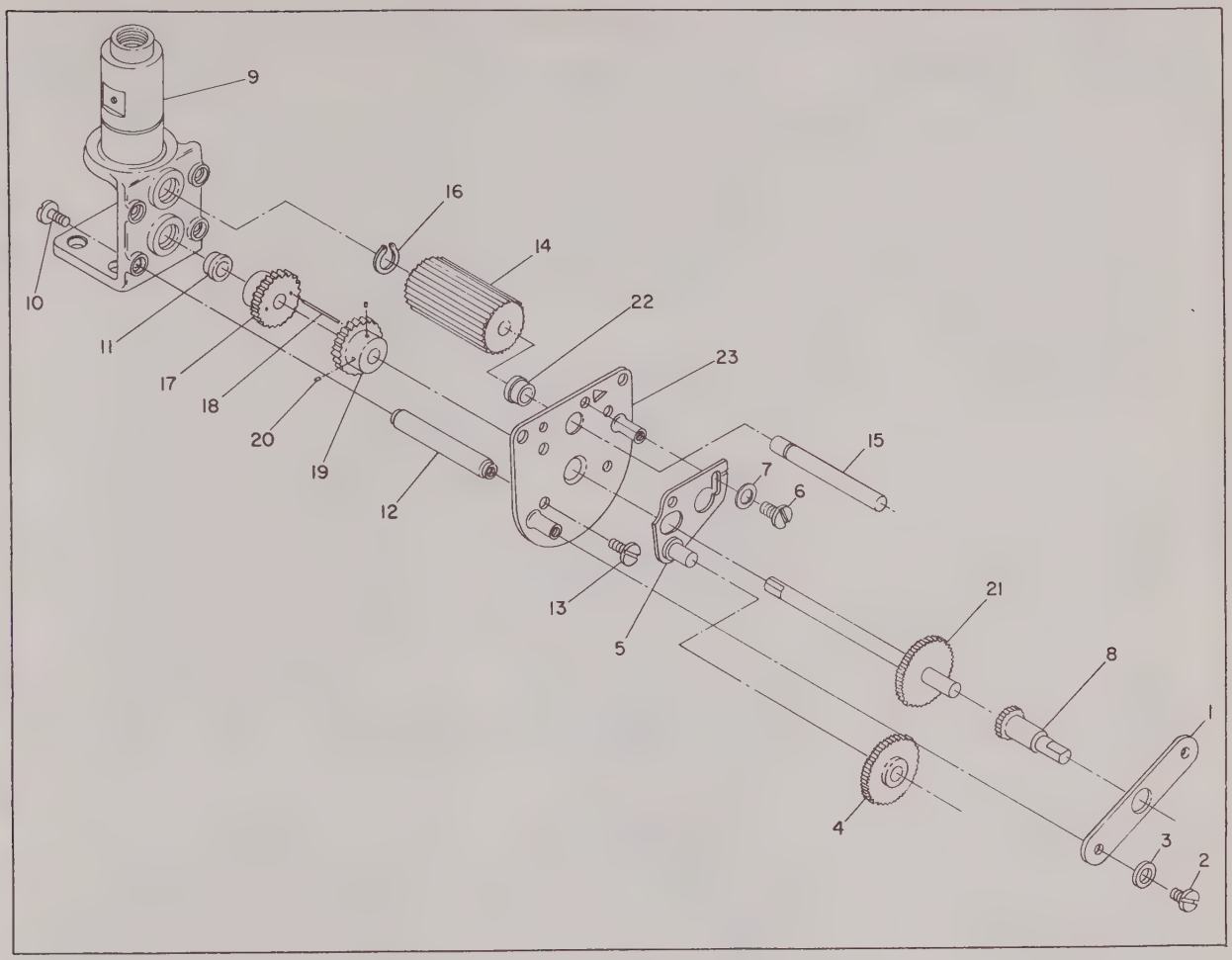


Figure 9. Speed Decreaser Gear Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
8-119	229-109	. COVER, Cavity (01113)	1	
-120	228-130	. HOUSING, Front (01113)	1	
		(ATTACHING PARTS)		
-121	COML	. SCREW, CAP, SOCKET HEAD, Filister head, .. cres, passivate finish, No. 10-32 by 3/8 in. lg	4	
		---*---		
-122	214-289	. SHIELDING GASKET, ELECTRONIC (01113) ...	1	
-123	228-134	. CHASSIS, ELECTRICAL EQUIPMENT (01113)...	1	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
9-	811-259	GEAR ASSEMBLY, SPEED DECREASER (01113) ... (See figure 8-14 for next higher assembly)	Ref	
-1	214-328	. PLATE, Retainer (01113) ..... (ATTACHING PARTS)	1	
-2	COML	. SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 6-32 by 1/4 in. lg	2	
-3	COML	. WASHER, LOCK, Steel, nickel plated, No. 6 .... ---*---	2	
-4	278-028	. GEAR CLUSTER, SPUR (01113)	1	
-5	811-253	. PLATE AND SHAFT ASSEMBLY (01113) ..... (ATTACHING PARTS)	1	
-6	COML	. SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 10-32 by 1/4 in. lg	2	
-7	COML	. WASHER, LOCK, Steel, nickel plated, No. 10 ... ---*---	1	
-8	278-029	. GEAR, SPUR (01113)	1	
-9	228-138	. RETAINER, Shaft (01113) ..... (ATTACHING PARTS)	1	
-10	COML	. SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 8-32 by 3/8 in. lg ---*---	4	
-11	FF312	. BEARING, SLEEVE (70417)	2	
-12	221-198	. SPACER, SLEEVE (01113) ..... (ATTACHING PARTS)	4	
-13	COML	. SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 8-32 by 3/8 in. lg ---*---	4	
-14	278-022	. GEAR, SPUR (01113)	1	
-15	226-024	. SHAFT, STRAIGHT (01113)	1	
-16	5133-25	. RING, RETAINING (79136)	1	
-17	278-025	. GEAR, SPUR (01113)	1	
-18	224-034	. PIN, STRAIGHT, HEADLESS (01113)	2	
-19	278-024	. GEAR, SPUR (01113) ..... (ATTACHING PARTS)	1	
-20	COML	. SETSCREW, Cres, passivate finish No. 8-32 ... by 3/16 in. lg ---*---	2	
-21	811-258	. GEAR, SPUR (01113)	1	
-22	FF312	. BEARING, SLEEVE (70417)	2	
-23	222-146	. PLATE, RETAINING, SHAFT (01113)	1	
10-	811-239	DETENT SWITCH ASSEMBLY (01113) (See ..... figure 8-25 for next higher assembly)	Ref	
-1	221-218	. COUPLING, SHAFT, RIGID (01113) ..... (ATTACHING PARTS)	1	
-2	COML	. SCREW, CAP, SOCKET HEAD, Filister head, ... cres, passivate finish, No. 6-32 by 3/8 in. lg ---*---	1	
-3	212-329	. COVER, Switch (01113) ..... (ATTACHING PARTS)	1	
-4	COML	. SCREW, TAPPING, THREAD FORMING, Round . head, cres, passivate finish, No. 4-40 by 3/16 in. lg ---*---	2	

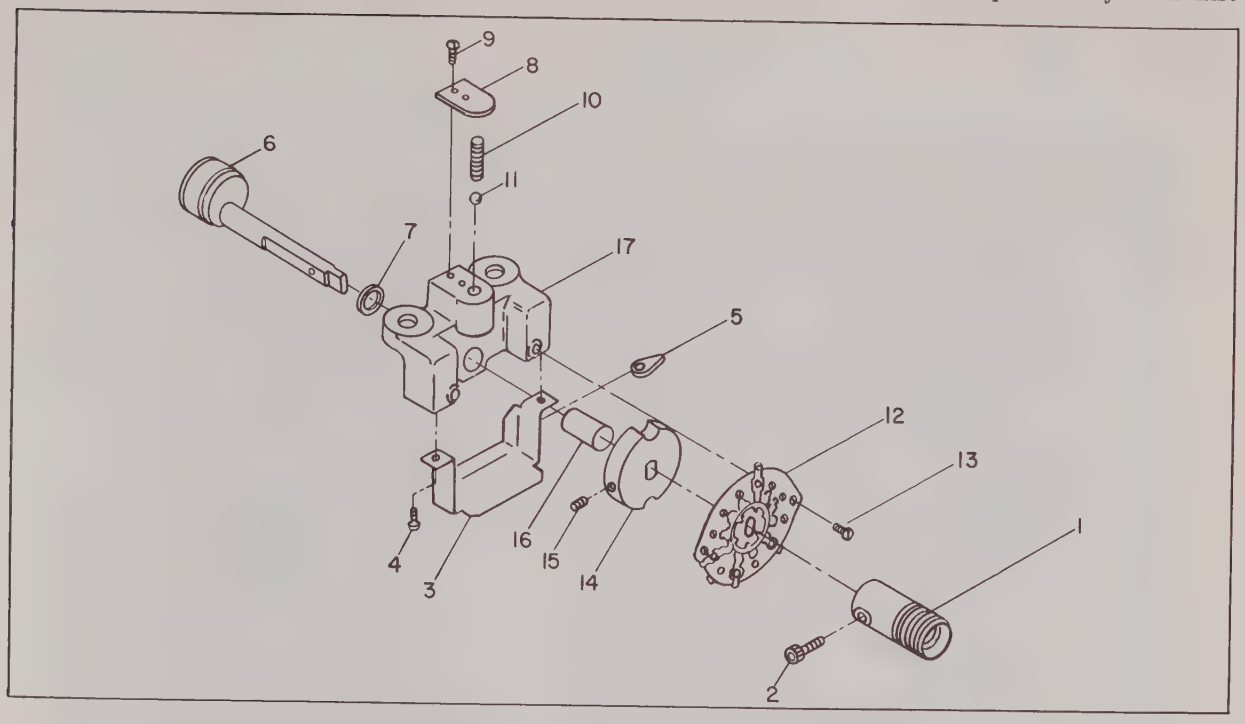


Figure 10. Detent Switch Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
10-5	701-003	. TERMINAL, LUG (01113)	1	
-6	811-250	. CAM, Switch (01113)	1	
-7	225-020	. WASHER, THRUST (01113)	2	
-8	213-333	. PLATE, Spring retainer (01113)	1	
		(ATTACHING PARTS)		
-9	COML	. SCREW, TAPPING, THREAD FORMING, ...	2	
		Round head, cres, passivate finish,		
		No. 4-40 by 3/16 in. lg		
		---*---		
-10	LC026B7	. SPRING, HELICAL, COMPRESSION (84830)	1	
-11	233-007	. BALL, Detent (01113)	1	
-12	161-124	. SWITCH SECTION, ROTARY (01113)	1	
		(ATTACHING PARTS)		
-13	COML	. SCREW, TAPPING, THREAD FORMING, ...	2	
		Round head, cres, passivate finish,		
		No. 4-40 by 1/4 in. lg		
		---*---		
-14	221-189	. CAM, Detent (01113)	1	
		(ATTACHING PARTS)		
-15	COML	. SETSCREW, Steel, black oxide, No. 8-32 by	1	
		5/16 in. lg		
		---*---		
-16	AA335-5	. BEARING, SLEEVE (70417)	1	
-17	228-136	. HOUSING, Switch detent (01113)	1	

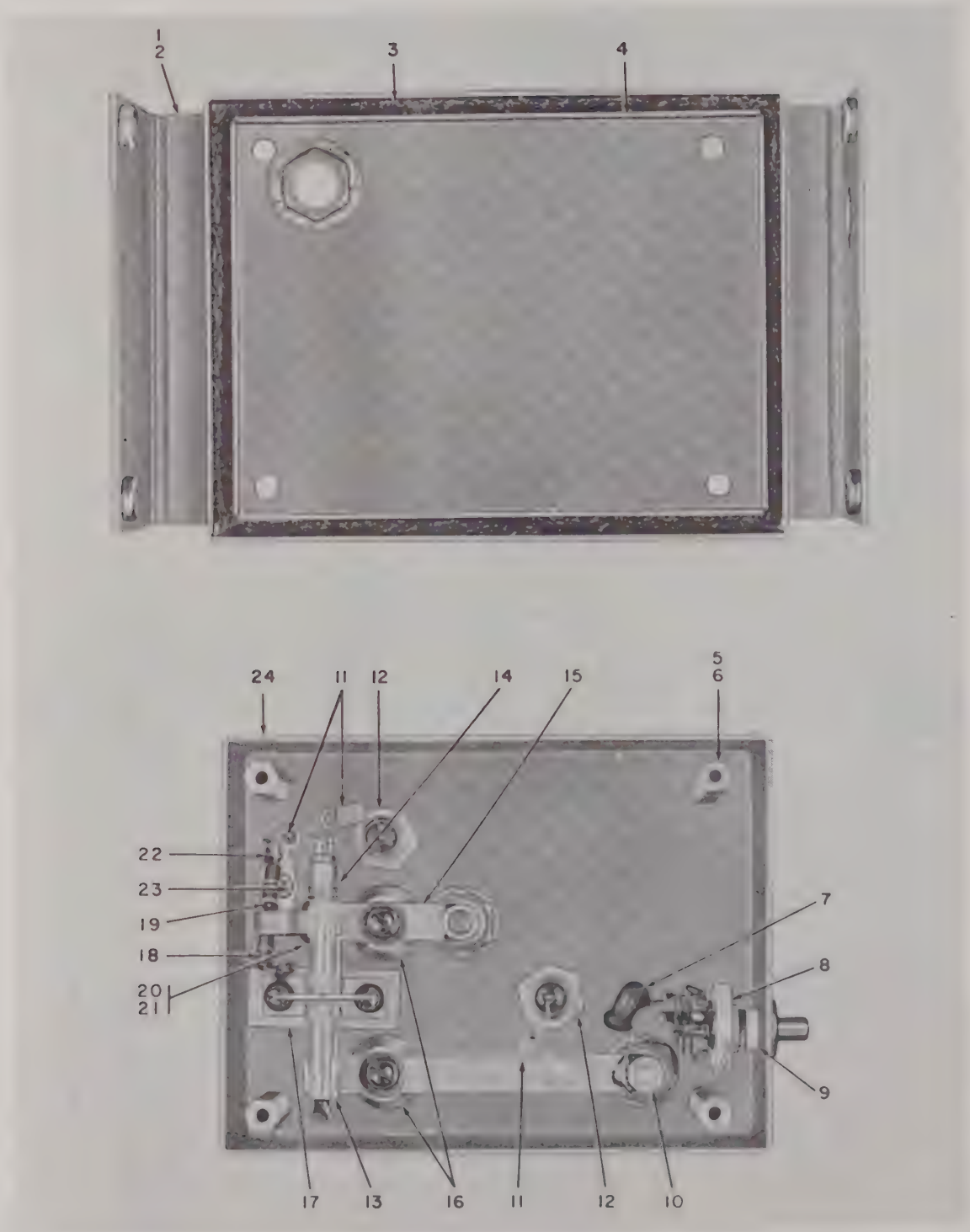


Figure 11. Radio Frequency Oscillator, Type FO-161

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
11-	811-311	OSCILLATOR, RADIO FREQUENCY, Type FO-161 (01113) (See figure 2-47 for next higher assembly)	Ref	
-1	813-162	. BRACKET ASSEMBLY (01113) (ATTACHING PARTS)	1	
-2	COML	. SCREW, MACHINE, Binding head, steel, nickel plate, No. 6-32 by 3/8 in. lg	4	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 6 ---*---	4	
-3	616-001	. SHIELDING GASKET, ELECTRONIC (01113)	AR	
-4	212-383	. COVER, Oscillator (01113)	1	
-5	225-021	. NUT, SLEEVE, Steel, cadmium plated, No. 6-32 by 1-3/4 in. lg (01113) (ATTACHING PARTS)	4	
-6	COML	. SCREW, MACHINE, Binding head, steel, nickel plated, No. 6-32 by 3/8 in. lg ---*---	4	
-7	331000C0K0159C	. CAPACITOR, FIXED, CERAMIC DIELECTRIC, 1.5 uuf ±20 pct, 500 vdcw (72982)	1	
-8	MAC5	. CAPACITOR, VARIABLE, 1.3 to 5.4 uuf, 500 vdcw (80583) (Supplied w/mtg hardware)	1	
-9	752-008	. SPACE, SLEEVE (01113)	1	
-10	1002-001	. CAPACITOR ASSEMBLY (01113) (Supplied w/mtg hardware)	1	
-11	156-089	. COIL, RADIO FREQUENCY (01113)	3	
-12	823-018	. FILTER, RADIO INTERFERENCE (01113) (Supplied w/mtg hardware)	2	
-13	131-501	. ELECTRON TUBE (01113)	1	
-14	22-3	. SOCKET, ELECTRON TUBE (81073)	1	
-15	1000-002	. CAPACITOR ASSEMBLY (01113) (Supplied w/mtg hardware)	1	
-16	430	. INSULATOR, STANDOFF (71002) (Supplied w/mtg hardware)	2	
-17	811-122	. CAPACITOR ASSEMBLY (01113) ---*---	1	
-18	EB4721	. RESISTOR, FIXED, COMPOSITION, 4700 ohms ±10 pct, 1/2 w (01121)	1	
-19	EB1011	. RESISTOR, FIXED, COMPOSITION, 100 ohms ±10 pct, 1/2 w (01121)	1	
-20	370FA	. CAPACITOR, FIXED, MICA DIELECTRIC, 1000 uuf ±2 pct, 500 vdcw (72982) (ATTACHING PARTS)	1	
-21	COML	. SCREW, MACHINE, Round head, steel, nickel plated, No. 3-48 by 3/16 in. lg	1	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 3 ---*---	1	
-22	701-011	. TERMINAL, LUG (01113) (ATTACHING PARTS)	1	
-23	COML	. RIVET, TUBULAR	1	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 5 ---*---	1	
-24	212-385	. CHASSIS, ELECTRICAL EQUIPMENT (01113)	1	

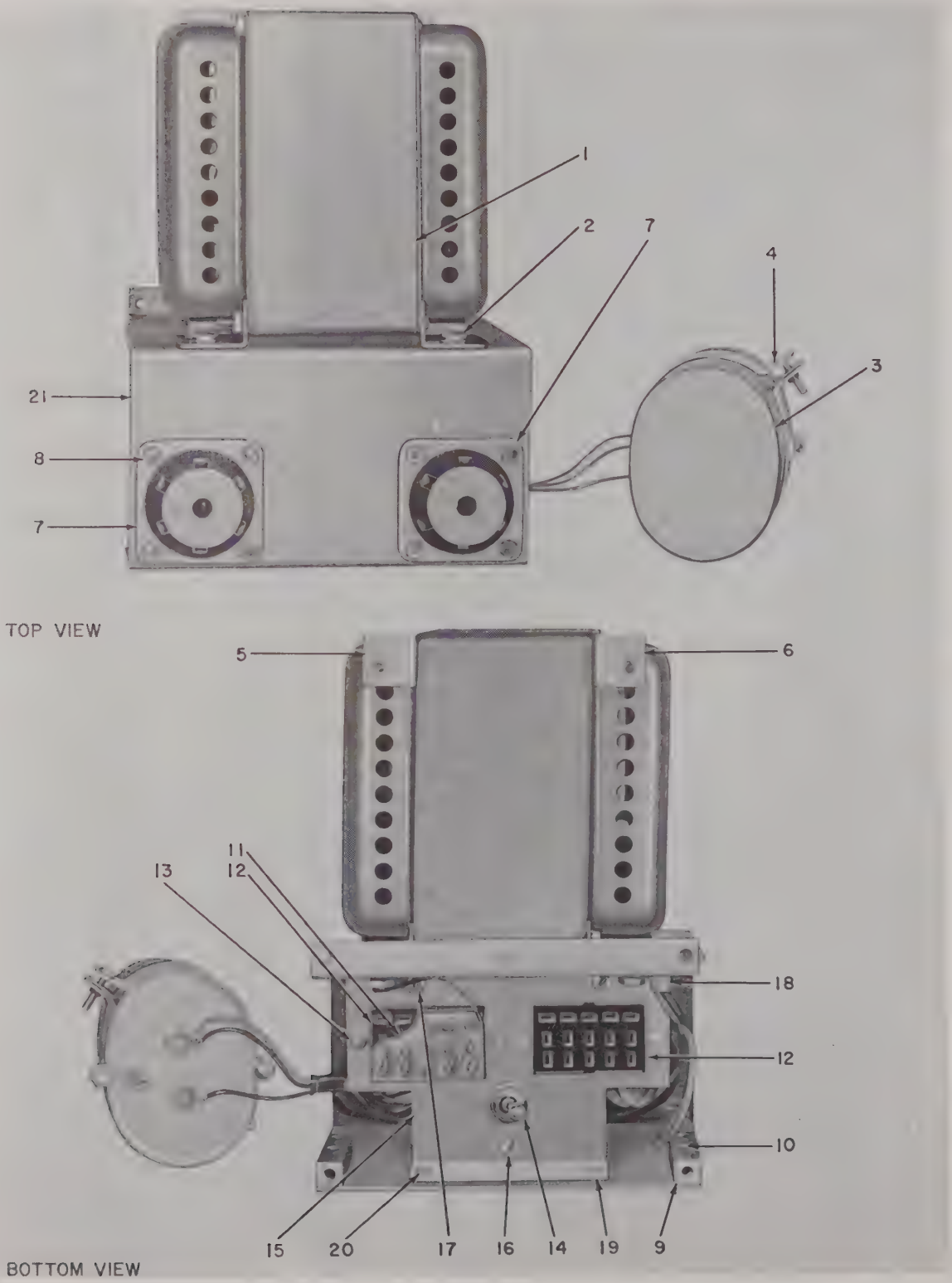


Figure 12. Rear Shock Mount and Transformer Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
12-	811-309	REAR SHOCK MOUNT AND TRANSFORMER ASSEMBLY (01113) (See figure 2-49 for next higher assembly)	Ref	
-1	71542	. TRANSFORMER, POWER, VOLTAGE REGULATING (55814)	1	
		(ATTACHING PARTS)		
-2	COML	. SCREW, MACHINE, Binding head, steel, nickel plated, No. 10-32 by 3/8 in. lg	4	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 10	4	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated, No. 10-32	2	
		---*---		
-3	P145A64	. CAPACITOR, FIXED, ELECTROLYTIC, 1.43 uf ±2 pct, 1190 vdcw (00656) (Supplied with item 12-1, P/N 71542) (See figure 2-49 and 2-84 for location)	1	
		(ATTACHING PARTS)		
-4	222-149	. CLAMP, CAPACITOR (01113) (Supplied w/mtg hardware)	1	
		---*---		
-5	214-314	. BRACKET, ANGLE, RH (01113)	1	
-6	214-315	. BRACKET, ANGLE, LH (01113)	1	
-7	5205	. MOUNT, RESILIENT (81860)	2	
		(ATTACHING PARTS)		
-8	COML	. SCREW, TAPPING, THREAD FORMING, Hex head, steel, nickel plated, No. 8-32 by 1/4 in. lg	8	
		---*---		
-9	222-148	. SUPPORT, Rear (01113)	2	
		(ATTACHING PARTS)		
-10	COML	. SCREW, MACHINE, Binding head, steel, nickel plated, No. 8-32 by 3/8 in. lg	4	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 8	4	
		---*---		
-11	P315FHT	. CONNECTOR, PLUG, ELECTRICAL, 15 contacts (75173)	1	
-12	S315EB	. CONNECTOR, RECEPTACLE, ELECTRICAL, 15 contacts (75173)	2	
		(ATTACHING PARTS)		
-13	COML	. RIVET, TUBULAR	4	
		---*---		
-14	316-63	. SWITCH, TOGGLE, DPDT (73559) (Supplied w/mtg hardware)	1	
-15	213-340	. PLATE, RETAINING, ELECTRICAL CONNECTOR (01113)	1	
		(ATTACHING PARTS)		
-16	COML	. SCREW, MACHINE, Binding head, steel, nickel plated, No. 6-32 by 3/8 in. lg	3	
		---*---		
-17	2106-06-00	. TERMINAL, LUG (78189)	1	
-18	214-311	. BRACKET, ANGLE (01113)	1	
-19	214-312	. BRACKET, ANGLE (01113)	1	
		(ATTACHING PARTS)		
-20	COML	. RIVET, TUBULAR	2	
		---*---		
-21	214-305	. BRACKET, DOUBLE ANGLE (01113)	1	

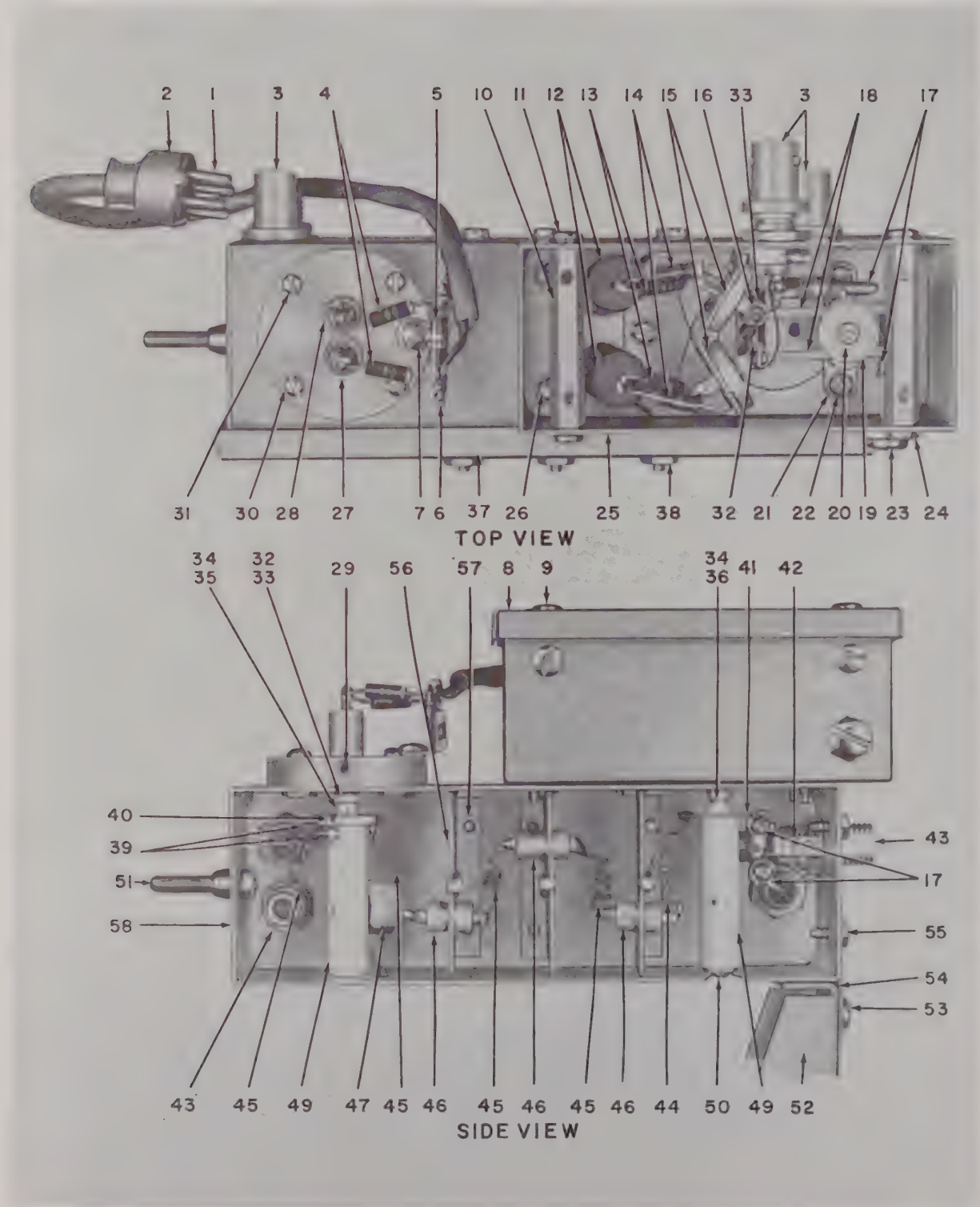


Figure 13. Frequency Mixer Stage, Type M-157

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
13-	811-315	MIXER STAGE, FREQUENCY, Type M-157 ..... (01113) (See figure 2-55 for next higher assembly)	Ref	
-1	2770K	. CONNECTOR, PLUG, ELECTRICAL, 4 contacts. (75173)	1	
-2	2704	. SHELL, ELECTRICAL CONNECTOR (75173) ...	1	
-3	UG-657/U	. CONNECTOR, RECEPTACLE, ELECTRICAL... (02660) (Supplied w/mtg hardware)	3	
-4	EB3015	. RESISTOR, FIXED, COMPOSITION, 300 ohms .. ±5 pct, 1/2 w (01121)	2	
-5	EB1045	. RESISTOR, FIXED, COMPOSITION, ... 100,000 ohms ±5 pct, 1/2 w (01121)	1	
-6	234-401	. TERMINAL BOARD (01113)..... (ATTACHING PARTS)	1	
-7	COML	. SCREW, MACHINE, Pan head, steel, nickel .... plated, No. 6-32 by 1/4 in. lg	1	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 6 .... ---*---	1	
-8	811-113	. COVER ASSEMBLY, Top (01113) ..... (ATTACHING PARTS)	1	
-9	COML	. SCREW, MACHINE, Binding head, steel, nickel.. plated, No. 6-32 by 3/4 in. lg ---*---	4	
-10	225-011	. NUT, SLEEVE, Steel, cadmium plated, ... No. 6-32 by 1-15/32 in. lg (01113) (ATTACHING PARTS)	2	
-11	COML	. SCREW, MACHINE, Binding head, steel,..... nickel plated, No. 6-32 by 3/4 in. lg	4	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 6 .... ---*---	4	
-12	P8292ZN11A	. CAPACITOR, FIXED, METALLIZED PAPER .. DIELECTRIC, 250,000 uuf ±10 pct, 200 vdcw (00656)	2	
-13	EB51G5	. RESISTOR, FIXED, COMPOSITION, 5.1 ohms... ±5 pct, 1/2 w (01121) (Matched set)	2	
-14	NO NUMBER	. RESISTOR, FIXED, COMPOSITION (These ..... items to be selected for resistance values at calibration)	2	
-15	4700CB	. CAPACITOR, FIXED, MICA DIELECTRIC, ... 5400 uuf ±2 pct, 500 vdcw (72982) (ATTACHING PARTS)	2	
-16	COML	. SCREW, MACHINE, Round head, steel, nickel... plated, No. 2-56 by 3/16 in. lg	2	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 2 .... ---*---	2	
-17	0536-000-4R	. CAPACITOR, VARIABLE, CERAMIC..... DIELECTRIC, 0.7 to 3.0 uuf, 500 vdcw (72982)	4	
-18	263TC	. TERMINAL, LUG (79963).....	2	
-19	232-037	. INSULATOR, DISK (01113)..... (ATTACHING PARTS)	1	
-20	COML	. SCREW, TAPPING, THREAD FORMING, ... Round head, steel, nickel plated, No. 4 by 3/8 in. lg ---*---	1	
-21	232-036	. INSULATOR, STANDOFF (01113)..... (ATTACHING PARTS)	1	
-22	COML	. SCREW, TAPPING, THREAD FORMING, ... Round head, steel, nickel plated, No. 4 by 3/8 in. lg ---*---	1	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
13-23	COML	. SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 10-32 by 1/4 in. lg	1	
-24	COML	. NUT, PLAIN, HEXAGON, Steel, nickel ..... plated, No. 10-32	1	
-25	811-111	. HOUSING, Mixer, uhf (01113) ..... (ATTACHING PARTS)	1	
-26	COML	. SCREW, TAPPING, THREAD FORMING, Hex ... head, steel, cadmium plated, No. 4 by 3/16 in. lg	3	
		---*---		
-27	1000-101	. CAPACITOR ASSEMBLY, 1000 uuf +100, -0.... pct, 500 vdcw (01113)	1	
-28	1000-102	. CAPACITOR ASSEMBLY 47 uuf ±10 pct, ... 500 vdcw (01113) (ATTACHING PARTS)	1	
-29	COML	. SETSCREW, Steel, nickel plated, No. 6-32 ..... by 3/16 in. lg	2	
		---*---		
-30	222-117	. HEATSINK, Semiconductor Device - capacitor .. (01113) (ATTACHING PARTS)	1	
-31	COML	. SCREW, MACHINE, Round head, steel, ... nickel plated, No. 4-40 by 3/8 in. lg	4	
		---*---		
-32	139-111	. SEMICONDUCTOR DEVICE, DIODE (01113).....	2	
-33	139-107	. SEMICONDUCTOR DEVICE, DIODE (01113).....	2	
-34	222-118	. HOLDER, SEMICONDUCTOR DEVICE (01113)... (ATTACHING PARTS)	2	
-35	COML	. SCREW, MACHINE, Round head, steel, nickel... plated, No. 2-56 by 3/8 in. lg	1	
-36	COML	. SCREW, MACHINE, Round head, steel, nickel... plated, No. 2-56 by 1/4 in. lg	1	
		---*---		
-37	810-110	. COVER ASSEMBLY, Side (01113)..... (ATTACHING PARTS)	1	
-38	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated, .. No. 6-32	3	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 6	3	
		---*---		
-39	CB1015	. RESISTOR, FIXED, COMPOSITION, 100 ohms... ±5 pct, 1/4 w (01121)	2	
-40	4700CH	. CAPACITOR, FIXED, CERAMIC DIELECTRIC,.. 1000 uuf ±2 pct, 500 vdcw (72982)	1	
-41	37TC	. TERMINAL, LUG (79963)	1	
-42	215-124	. TERMINAL, STRIP (01113)	1	
-43	HFT65A	. CAPACITOR, VARIABLE PLASTIC ..... DIELECTRIC (01113) (Supplied w/mtg hardware)	2	
-44	1000-103	. COIL, RADIO FREQUENCY (01113).....	1	
-45	1000-104	. COIL, RADIO FREQUENCY (01113).....	4	
-46	811-123	. CAPACITOR, FIXED, PLASTIC ..... DIELECTRIC (01113)	3	
-47	201-022	. COIL, RADIO FREQUENCY (01113)..... (ATTACHING PARTS)	1	
-48	COML	. SCREW, MACHINE, Round head, steel, nickel... plated, No. 2-56 by 9/16 in. lg	1	
	232-033	. INSULATOR, WASHER (01113)	1	
		---*---		
-49	282-003	. INSULATOR, STANDOFF (01113).....	2	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
13-		(ATTACHING PARTS)		
-50	COML	. SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 6-32 by 1/4 in. lg	2	
	COML	. WASHER, FLAT, Steel, nickel plated, No. 6	1	
-51	102	. PLUG, TIP (83330) (Supplied w/mtg hardware) ..	1	
-52	214-313	. BRACKET, ANGLE (01113) ..... (ATTACHING PARTS)	1	
-53	COML	. SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 6-32 by 3/8 in. lg	2	
		---*---		
-54	213-341	. PLATE, Adapter (01113) ..... (ATTACHING PARTS)	1	
-55	COML	. SCREW, TAPPING, THREAD FORMING, Hex ... head, steel, nickel plated, No. 6 by 1/4 in. lg	2	
		---*---		
-56	214-094	. PLATE, ELECTRICAL SHIELD (01113) ..... (ATTACHING PARTS)	3	
-57	COML	. SCREW, TAPPING, THREAD FORMING, Hex ... head, steel, cadmium plated, No. 4 by 3/16 in. lg	6	
		---*---		
-58	212-151	. CHASSIS, ELECTRICAL EQUIPMENT (01113) ..	1	
14-	811-314	AMPLIFIER, RADIO FREQUENCY Type ..... PBA-172 (01113) (See figure 2-60 for next higher assembly)	Ref	
-1	2N1224	. TRANSISTOR (03606)	2	
-2	271-101	. SHIELD, ELECTRON TUBE (01113).....	1	
-3	271-102	. SHIELD, ELECTRON TUBE (01113).....	2	
-4	6AU6	. ELECTRON TUBE (03606).....	1	
-5	12AY7	. ELECTRON TUBE (03507).....	1	
-6	7308	. ELECTRON TUBE (73345).....	1	
-7	13219	. CONNECTOR, RECEPTACLE, ELECTRICAL, .. 14 contacts (75173)	1	
-8	4708	. SHELL, ELECTRICAL CONNECTOR (75173) ...	1	
-9	EB1021	. RESISTOR, FIXED, COMPOSITION, 1000 ohms.. ±10 pct, 1/2 w (01121)	4	
-10	EB1045	. RESISTOR, FIXED, COMPOSITION, ... 100,000 ohms ±5 pct, 1/2 w (01121)	3	
-11	EB4731	. RESISTOR, FIXED, COMPOSITION, ... 47,000 ohms ±10 pct, 1/2 w (01121)	1	
-12	GB7535	. RESISTOR, FIXED, COMPOSITION, ... 75,000 ohms ±5 pct, 1 w (01121)	1	
-13	EB5125	. RESISTOR, FIXED, COMPOSITION, 5100 ..... ohms ±5 pct, 1/2 w (01121)	1	
-14	GB1535	. RESISTOR, FIXED, COMPOSITION, 15,000 ..... ohms ±5 pct, 1 2 (01121)	1	
-15	HB1521	. RESISTOR, FIXED, COMPOSITION, 1500..... ohms ±10 pct, 2 w (01121)	2	
-16	EB3035	. RESISTOR, FIXED, COMPOSITION, 30,000 ..... ohms ±5 pct, 1/2 w (01121)	2	
-17	EB5145	. RESISTOR, FIXED, COMPOSITION, 510,000 .... ohms ±5 pct, 1/2 w (01121)	2	
-18	EB2205	. RESISTOR, FIXED, COMPOSITION, 22 ohms ... ±5 pct, 1/2 w (01121)	1	

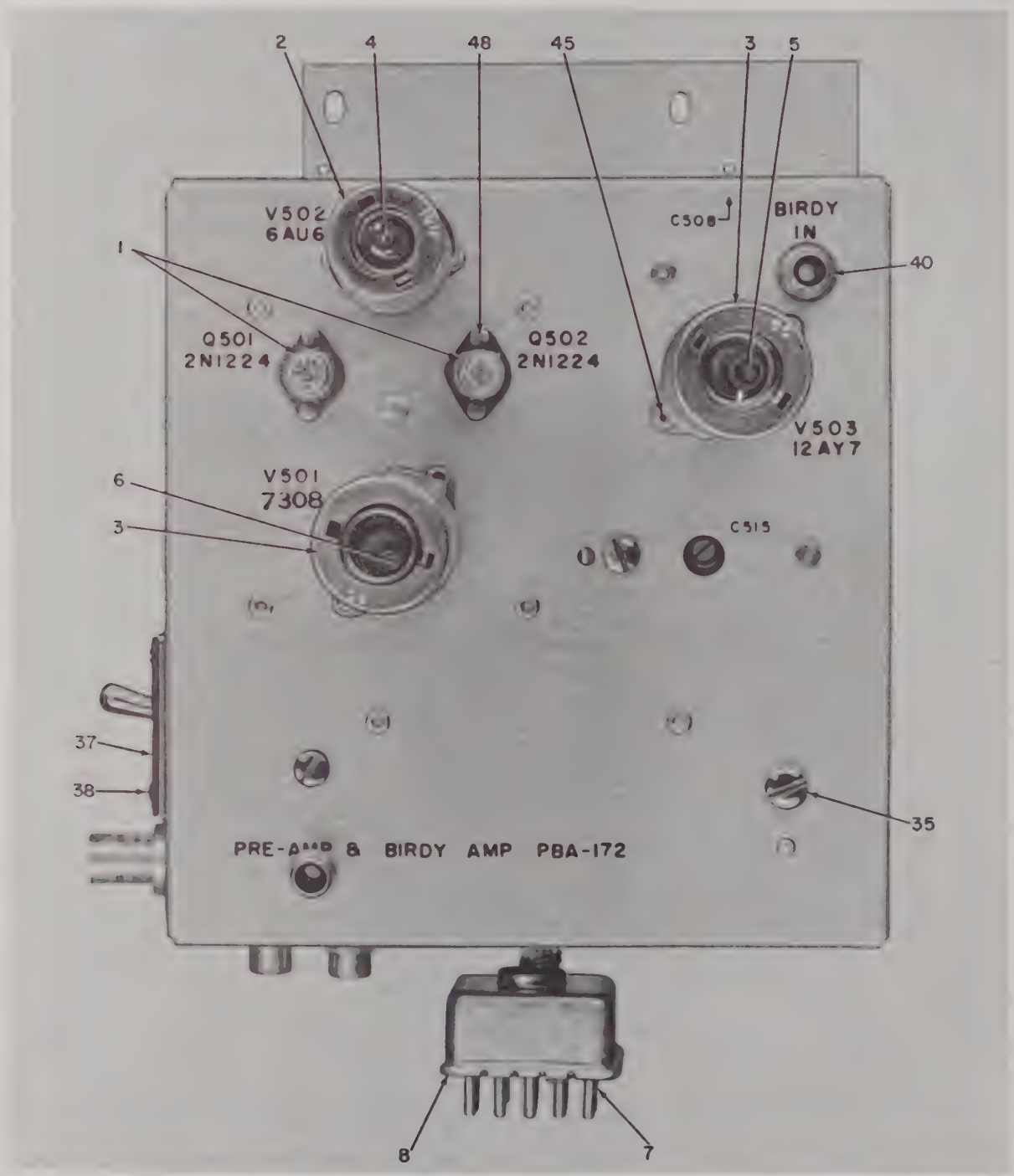


Figure 14. Radio Frequency Amplifier, Type PBA-172 (Sheet 1 of 2)

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
14-19	EB2745	. RESISTOR, FIXED, COMPOSITION, ... 270,000 ohms ±5 pct, 1/2 w (01121)	2	
-20	EB4701	. RESISTOR, FIXED, COMPOSITION, 470 ohms... ±10 pct, 1/2 w (01121)	2	
-21	EB5641	. RESISTOR, FIXED, COMPOSITION, ... 560,000 ohms ±10 pct, 1/2 w (01121)	3	
-22	BBR12-150	. CAPACITOR, FIXED, ELECTROLYTIC, ... 12 uf ±20 pct, 150 vdcw (14655)	2	
-23	P88N20000MM F200-10	. CAPACITOR, FIXED, PAPER DIELECTRIC, ... 20,000 uuf ±10 pct, 200 vdcw (00656)	1	
-24	P8292ZN11A	. CAPACITOR, FIXED, METALLIZED PAPER... DIELECTRIC, 250,000 uuf ±10 pct, 200 vdcw (00656)	5	
-25	MD19152J	. CAPACITOR, FIXED, MICA DIELECTRIC, ... 1500 uuf ±5 pct, 200 vdcw (72136)	1	
-26	MD20128G	. CAPACITOR, FIXED, MICA DIELECTRIC, ... 1800 uuf ±2 pct, 200 vdcw (72136)	1	
-27	466	. CAPACITOR, VARIABLE CERAMIC ..... DIELECTRIC, 80 to 480 uuf, 200 vdcw (72136)	1	
-28	D6-202	. CAPACITOR, FIXED, CERAMIC DIELECTRIC,.. 2000 uuf ±20 pct, 600 vdcw (71590)	1	
-29	464	. CAPACITOR, VARIABLE, CERAMIC ..... DIELECTRIC, 25 to 280 uuf, 200 vdcw (72136)	1	
-30	ED.01	. CAPACITOR, FIXED, CERAMIC ..... DIELECTRIC, 10,000 uuf ±10 pct, 500 vdcw (72982)	1	
-31	469	. CAPACITOR, VARIABLE, CERAMIC..... DIELECTRIC, 170 to 780 uuf, 200 vdcw (72136)	1	
-32	0557-000UP20-34R	. CAPACITOR, VARIABLE, CERAMIC ..... DIELECTRIC, 8 to 50 uuf, 200 vdcw (72982)	1	
-33	65P47304	. CAPACITOR, FIXED, PAPER DIELECTRIC,.... 47,000 uuf ±5 pct, (56289)	1	
-34	GA11D	. RELAY, ARMATURE, DPDT (77342)..... (ATTACHING PARTS)	1	
-35	COML	. SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 8-32 by 3/8 in. lg	1	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 8 .... ---*---	1	
-36	316-63	. SWITCH, TOGGLE, DPDT (73559) (Supplied .... w/mtg hardware)	1	
-37	XLR3-32	. CONNECTOR, RECEPTACLE, ELECTRICAL, .. 3 contacts (01146) (ATTACHING PARTS)	1	
-38	COML	. SCREW, MACHINE, Round head, steel, nickel .. plated, No. 4-40 by 1/4 in. lg	2	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 4	2	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel ..... plated, No. 4-40 ---*---	2	
-39	UG-657/U	. CONNECTOR, RECEPTACLE, ELECTRICAL, .. 1 contact (02660) (Supplied w/mtg hardware)	1	
-40	3501FP	. JACK, PLUG (82389) (Supplied w/mtg hardware). (ATTACHING PARTS)	4	
-41	COML	. WASHER, LOCK, Steel, nickel plated, 1/4 in. ... id by 5/16 in. od by 1/32 in. thk ---*---	3	

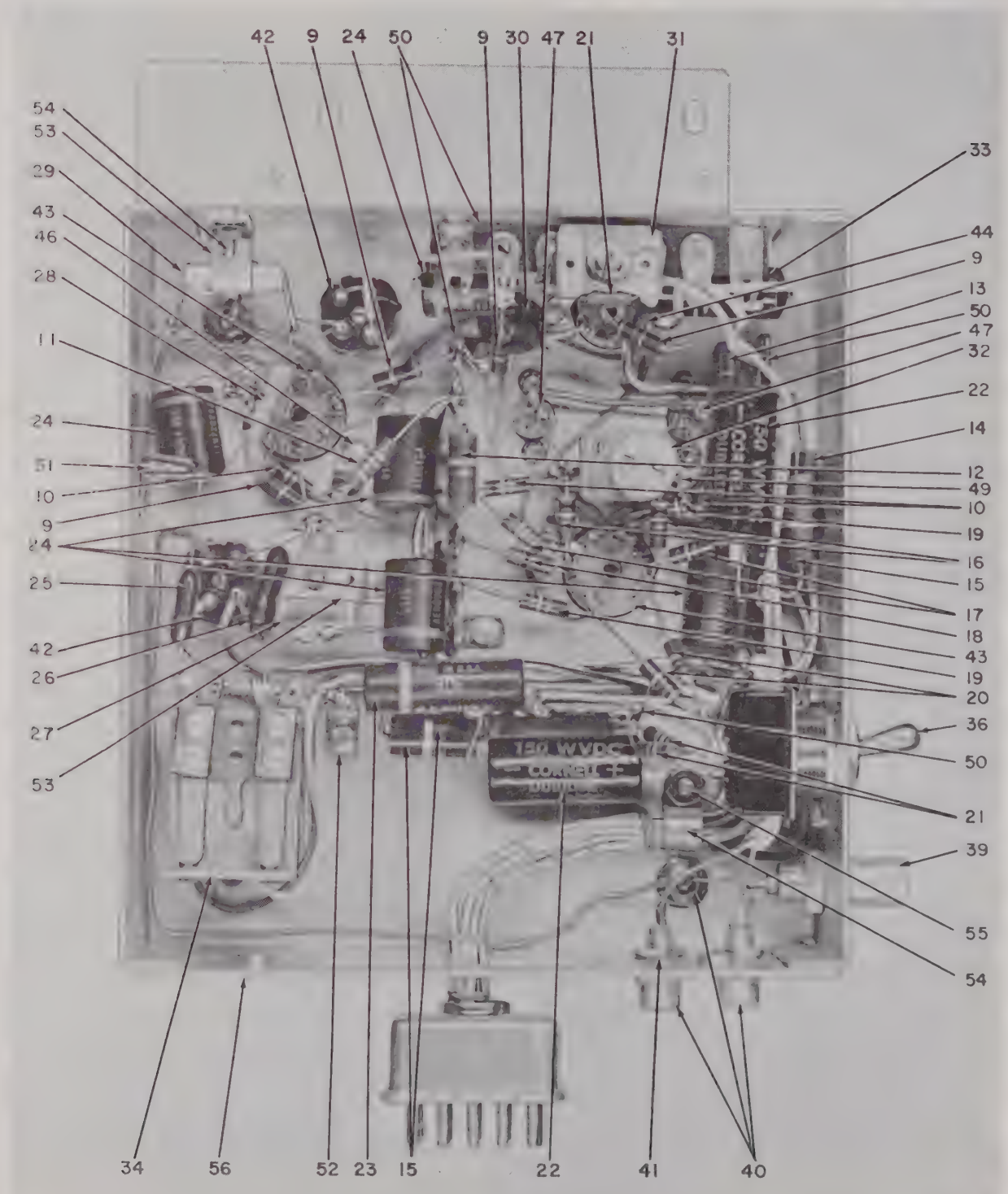


Figure 14. Radio Frequency Amplifier, Type PBA-172 (Sheet 2 of 2)

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
14-42	823-021	. TRANSFORMER, RADIO FREQUENCY ..... (01113) (Supplied w/mtg hardware)	2	
-43	181-241	. SOCKET, ELECTRON TUBE (01113)	2	
-44	181-145	. SOCKET, ELECTRON TUBE (01113) ..... (ATTACHING PARTS)	1	
-45	COML	. RIVET, TUBULAR	6	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 5 .... ---*---	6	
-46	2106-06-00	. TERMINAL, LUG (78189)	4	
-47	3312	. SOCKET, TRANSISTOR (91662) ..... (ATTACHING PARTS)	2	
-48	COML	. RIVET, TUBULAR	4	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 3 .... ---*---	4	
-49	234-400	. TERMINAL BOARD (01113)	1	
-50	234-469	. TERMINAL BOARD (01113)	4	
-51	234-419	. TERMINAL BOARD (01113) ..... (ATTACHING PARTS)	1	
-52	COML	. RIVET, TUBULAR	10	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 5 ---*---	10	
-53	214-238	. BRACKET, ANGLE (01113)	2	
-54	774-002	. STRAP, RETAINING (01113) ..... (ATTACHING PARTS)	1	
-55	COML	. SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 6-32 by 3/8 in. lg	3	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 6	3	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel ..... plated, No. 6-32 ---*---	3	
-56	211-168	. CHASSIS, ELECTRICAL EQUIPMENT (01113) ..	1	
15-	811-313	GENERATOR, SIGNAL, Type HM-162 (01113) ..... (See figure 2-65 for next higher assembly)	Ref	
-1	271-102	. SHIELD, ELECTRON TUBE (01113)	2	
-2	271-101	. SHIELD, ELECTRON TUBE (01113)	1	
-3	6922	. ELECTRON TUBE (73345)	2	
-4	6CB6	. ELECTRON TUBE (03507)	1	
-5	F605 5000.000KC	. CRYSTAL UNIT, QUARTZ (01766)	1	
-6	224-004	. RETAINER, CRYSTAL HOLDER (01113) ..... (ATTACHING PARTS)	1	
-7	COML	. SCREW, MACHINE, Round head, steel, nickel... plated, No. 4-40 by 1/2 in. lg	1	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 4	1	
	296-001	. WASHER, NONMETALLIC (01113)	1	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel ..... plated, No. 4-40 ---*---	1	
-8	182-101	. SOCKET, CRYSTAL (01113)	1	

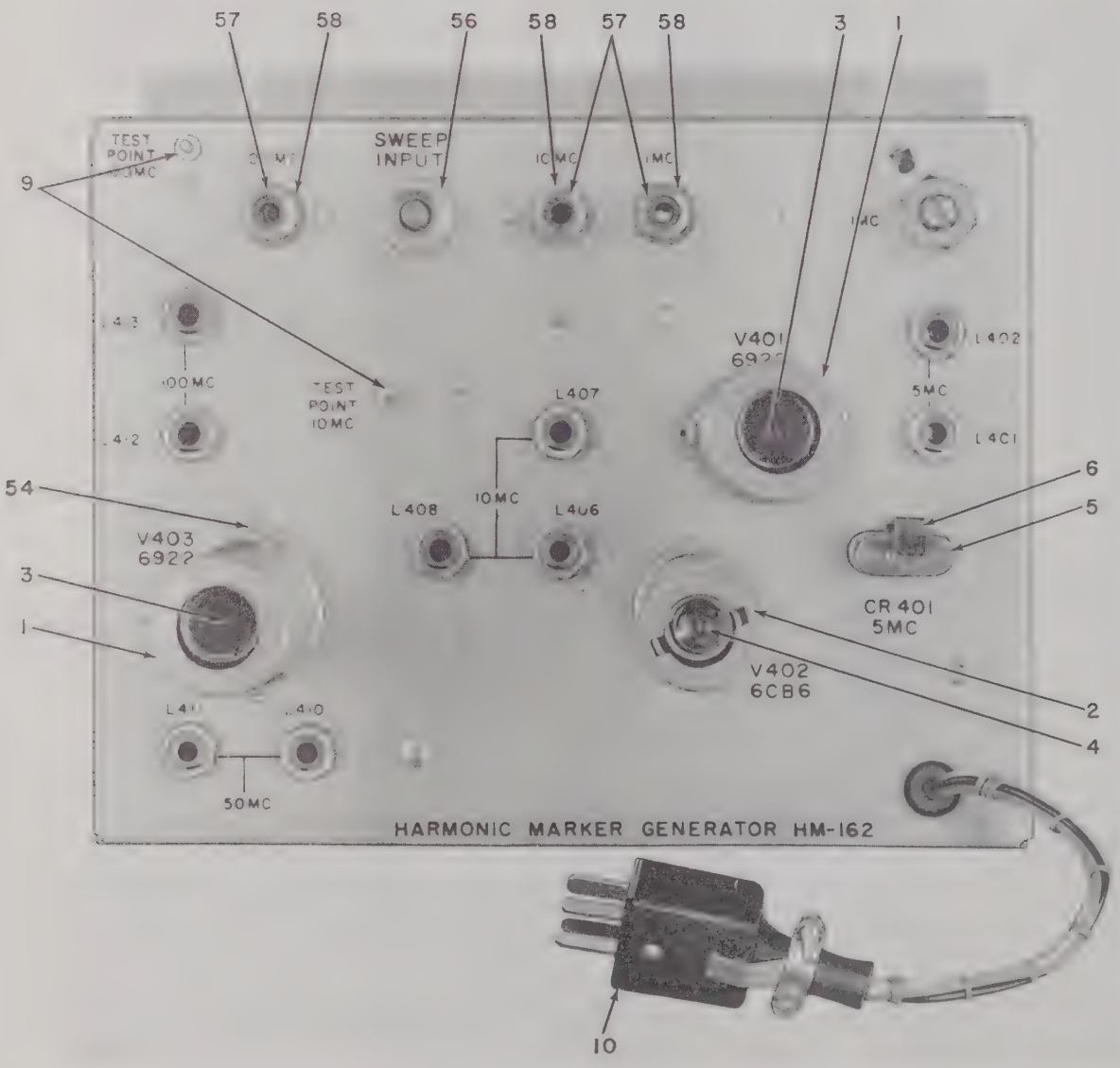


Figure 15. Signal Generator, Type HM-162 (Sheet 1 of 2)

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
15-9	FTSM2	. TERMINAL, INSULATED, FEEDTHRU (98291) ...	2	
-10	P304CCT	. CONNECTOR, PLUG, ELECTRICAL ..... 4 contacts (75173)	1	
-11	EB1041	. RESISTOR, FIXED, COMPOSITION, 100,000 .... ohms ±10 pct, 1/2 w (01121)	5	
-12	EB22G1	. RESISTOR, FIXED, COMPOSITION, 2.2 meg .... ±10 pct, 1/2 w (01121)	1	
-13	EB5635	. RESISTOR, FIXED, COMPOSITION, 56,000..... ohms ±5 pct, 1/2 w (01121)	1	
-14	EB1035	. RESISTOR, FIXED, COMPOSITION, 10,000..... ohms ±5 pct, 1/2 w (01121)	2	
-15	JL68833A	. RESISTOR, VARIABLE, 0 to 10,000 ohms ..... ±30 pct, 1/2 w (01121) (Supplied with mounting hardware)	1	
-16	EB5105	. RESISTOR, FIXED, COMPOSITION, 51 ohms..... ±5 pct, 1/2 w (01121)	2	
-17	EB1021	. RESISTOR, FIXED, COMPOSITION, 1000 ..... ohms ±10 pct, 1/2 w (01121)	3	
-18	EB1515	. RESISTOR, FIXED, COMPOSITION, 150 ohms ... ±5 pct, 1/2 w (01121)	3	
-19	EB5135	. RESISTOR, FIXED, COMPOSITION, 51,000 ..... ohms ±5 pct, 1/2 w (01121)	2	
-20	EB1051	. RESISTOR, FIXED, COMPOSITION, 1 meg ..... ±10 pct, 1/2 w (01121)	2	
-21	EB4731	. RESISTOR, FIXED, COMPOSITION, 47,000..... ohms ±10 pct, 1/2 w (01121)	1	
-22	TCZ24	. CAPACITOR, FIXED, CERAMIC ..... DIELECTRIC, 24 uuf ±2 pct, 600 vdcw (71590)	2	
-23	TCZ1R5	. CAPACITOR, FIXED, CERAMIC ..... DIELECTRIC, 1.5 uuf ±0.25 uuf, 600 vdcw (71590)	2	
-24	ED.01	. CAPACITOR, FIXED, CERAMIC ..... DIELECTRIC, 10,000 uuf ±10 pct, 500 vdcw (72982)	4	
-25	CM15E151J	. CAPACITOR, FIXED, MICA DIELECTRIC, ... 150 uuf ±5 pct, 500 vdcw (72136)	2	
-26	D6-390	. CAPACITOR, FIXED, CERAMIC ..... DIELECTRIC, 39 uuf ±10 pct, 600 vdcw (71590)	1	
-27	CM15E161J	. CAPACITOR, FIXED, MICA DIELECTRIC, ... 160 uuf ±5 pct, 500 vdcw (72136)	1	
-28	CM15E300J	. CAPACITOR, FIXED, MICA DIELECTRIC, ... 30 uuf ±5 pct, 500 vdcw (72136)	1	
-29	H1K60	. CAPACITOR, FIXED, CERAMIC ..... DIELECTRIC, 20,000 uuf ±10 pct, 500 vdcw (72982)	6	
-30	TCZ20	. CAPACITOR, FIXED, CERAMIC ..... DIELECTRIC, 20 uuf ±2 pct, 600 vdcw (71590)	1	
-31	CM15E121J	. CAPACITOR, FIXED, MICA DIELECTRIC, ... 120 uuf ±5 pct, 500 vdcw (72136)	2	
-32	TCZ3R3	. CAPACITOR, FIXED, CERAMIC ..... DIELECTRIC, 3.3 uuf ±0.25 uuf, 600 vdcw (71590)	1	
-33	301000C0K0758C	. CAPACITOR, FIXED, CERAMIC ..... DIELECTRIC, 0.75 uuf ±0.25 uuf, 200 vdcw (72982)	1	
-34	0536-000-4R	. CAPACITOR, VARIABLE, PLASTIC ..... DIELECTRIC, 0.7 to 3 uuf, 200 vdcw (72982)	3	
-35	331000U2M470K	. CAPACITOR, FIXED, CERAMIC ..... DIELECTRIC, 47 uuf ±5 pct, 500 vdcw (72982)	4	

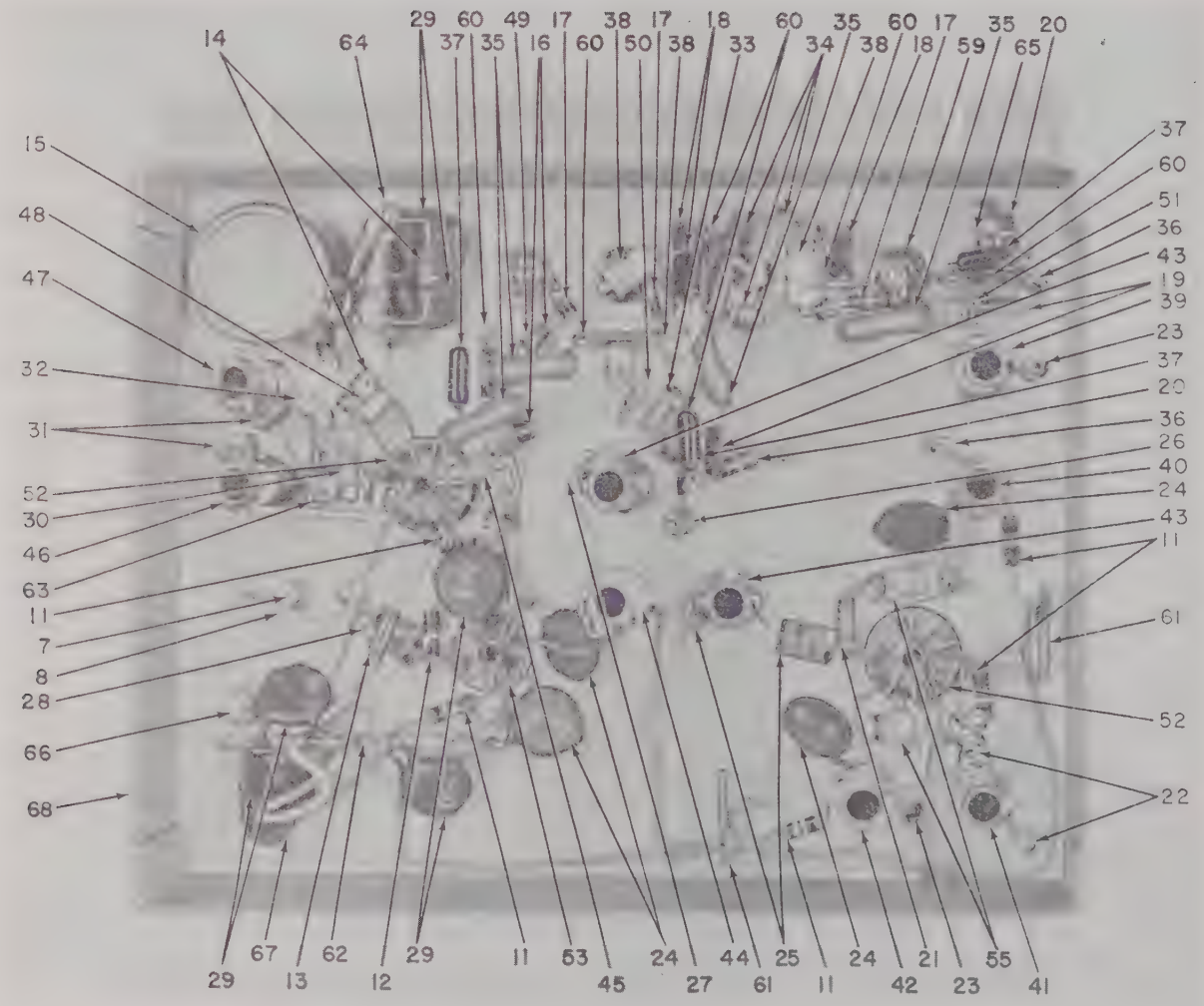


Figure 15. Signal Generator, Type HM-162 (Sheet 2 of 2)

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
15-36	TCZ1	. CAPACITOR, FIXED, CERAMIC ..... DIELECTRIC, 1 uuf ± 0.25 uuf, 600 vdcw (71590)	2	
-37	1N87	. SEMICONDUCTOR DEVICE, DIODE (73345).....	3	
-38	139-102	. SEMICONDUCTOR DEVICE, DIODE (01113).....	3	
-39	156-446	. COIL, RADIO FREQUENCY (01113) (Supplied ... w/mtg hardware)	1	
-40	156-445	. COIL, RADIO FREQUENCY (01113) (Supplied ... w/mtg hardware)	1	
-41	156-444	. COIL, RADIO FREQUENCY (01113) (Supplied ... w/mtg hardware)	1	
-42	156-442A	. COIL, RADIO FREQUENCY (01113) (Supplied ... w/mtg hardware)	1	
-43	156-442	. COIL, RADIO FREQUENCY (01113) (Supplied ... w/mtg hardware)	2	
-44	156-443	. COIL, RADIO FREQUENCY (01113) (Supplied ... w/mtg hardware)	1	
-45	156-458	. COIL, RADIO FREQUENCY (01113) (Supplied ... w/mtg hardware)	1	
-46	156-440	. COIL, RADIO FREQUENCY (01113) (Supplied... w/mtg hardware)	1	
-47	156-441	. COIL, RADIO FREQUENCY (01113) (Supplied ... w/mtg hardware)	1	
-48	156-461	. TRANSFORMER, RADIO FREQUENCY (01113).. (Supplied w/mtg hardware)	1	
-49	156-457	. COIL, RADIO FREQUENCY (01113) (Supplied ... w/mtg hardware)	1	
-50	156-459	. COIL, RADIO FREQUENCY (01113) (Supplied ... w/mtg hardware)	1	
-51	156-460	. COIL, RADIO FREQUENCY (01113) (Supplied ... w/mtg hardware)	1	
-52	181-241	. SOCKET, ELECTRON TUBE (01113).....	2	
-53	181-145	. SOCKET, ELECTRON TUBE (01113)..... (ATTACHING PARTS)	1	
-54	COML	. RIVET, TUBULAR	6	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 5	6	
		---*---		
-55	701-011	. TERMINAL, LUG (01113).....	4	
-56	UG-657/U	. CONNECTOR, RECEPTACLE, ELECTRICAL, .. 1 contact (02660) (Supplied w/mtg hardware)	1	
-57	3501FP	. JACK, TIP (82389) (Supplied w/mtg hardware) .. (ATTACHING PARTS)	3	
-58	COML	. WASHER, LOCK, Steel, nickel plated, 1/4 in. .. id by 3/8 in. od by 1/32 in. thk	3	
		---*---		
-59	263TC	. TERMINAL, LUG (79963)	1	
-60	234-473	. TERMINAL BOARD (01113)	6	
-61	234-400	. TERMINAL BOARD (01113)	2	
-62	234-427	. TERMINAL BOARD (01113)	1	
-63	234-417	. TERMINAL BOARD (01113)	1	
-64	234-419	. TERMINAL BOARD (01113) ..... (ATTACHING PARTS)	1	
-65	COML	. RIVET, TUBULAR	6	
-66	COML	. RIVET, TUBULAR	4	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 3	6	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 5	4	
		. ---*---	1	
-67	3342	. GROMMET, RUBBER (04941)	1	
-68	211-165	. CHASSIS, ELECTRICAL EQUIPMENT (01113) .. pct, 1/2 w (01121) (Supplied with mtg hardware)	1	

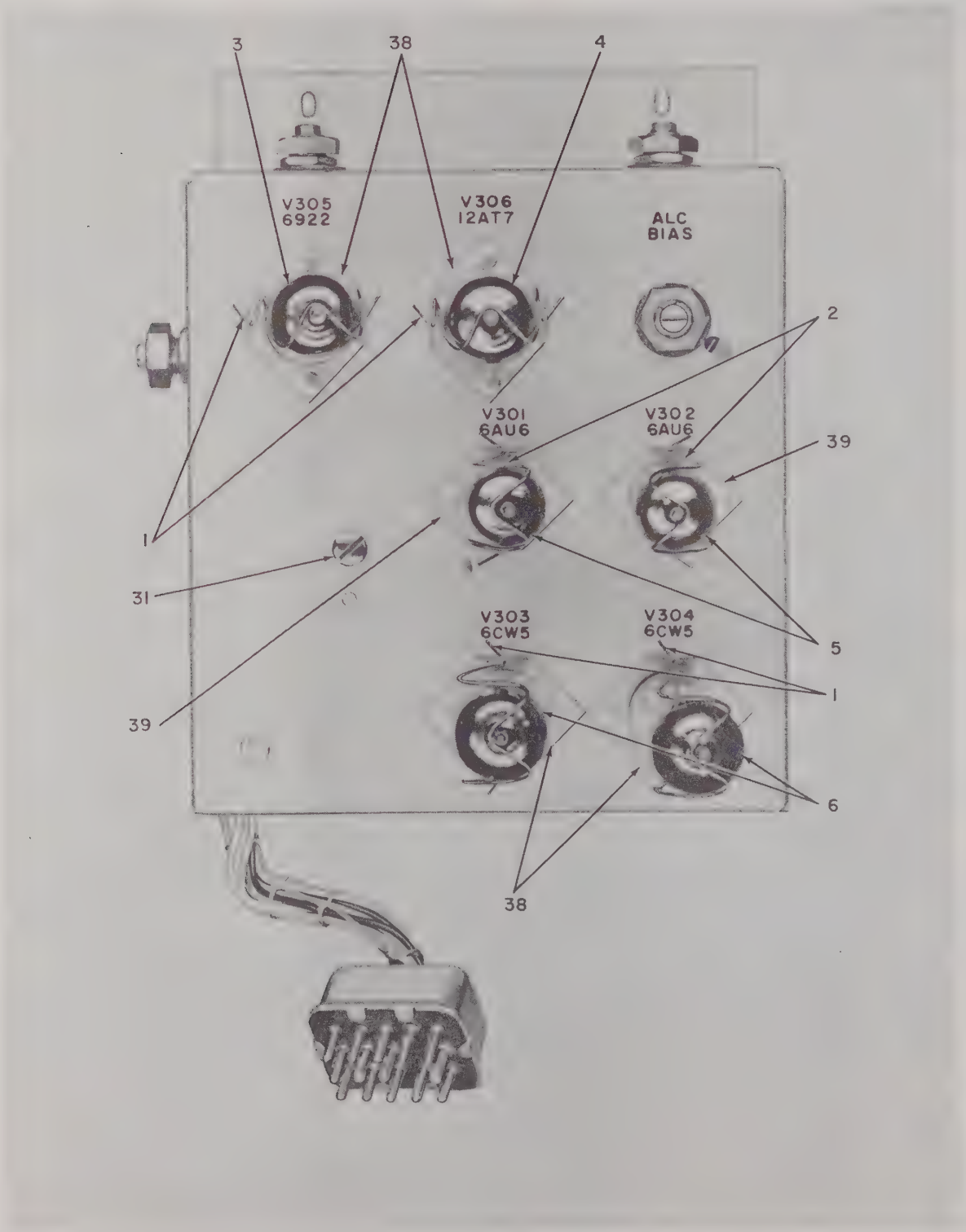


Figure 16. Amplifier-Oscillator, Type ABM-163 (Sheet 1 of 2)

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
16-	811-312	AMPLIFIER - OSCILLATOR, Type ABM-163 ..... (01113) (See figure 2-70 for next higher assembly)	Ref	
-1	774-022	. RETAINER, ELECTRON TUBE (01113)	4	
-2	774-034	. RETAINER, ELECTRON TUBE (01113)	2	
-3	6922	. ELECTRON TUBE (73345)	1	
-4	12AT7	. ELECTRON TUBE (03507)	1	
-5	6AU6	. ELECTRON TUBE (03507)	2	
-6	6CW5	. ELECTRON TUBE (73345)	2	
-7	118-083	. RESISTOR, VARIABLE, 0 to 100,000 ohms ..... ± 30 pct, 1/2 w (01113) (Supplied w/mtg hardware)	1	
-8	118-090	. RESISTOR, VARIABLE, 0 to 5000 ohms ± 30 .... pct, 1/2 w (01113) (Supplied w/mtg hardware)	1	
-9	EB33G1	. RESISTOR, FIXED, COMPOSITION, 3.3 meg .... ± 10 pct, 1/2 w (01121)	4	
-10	EB1541	. RESISTOR, FIXED, COMPOSITION, 150,000 .... ohms ± 10 pct, 1/2 w (01121)	3	
-11	EB4741	. RESISTOR, FIXED, COMPOSITION, 470,000 .... ohms ± 10 pct, 1/2 w (01121)	1	
-12	118-087	. RESISTOR, VARIABLE, 0 to 50,000 ohms ..... ± 30 pct, 1/2 w (01113) (Supplied w/mtg hardware)	1	
-13	EB4711	. RESISTOR, FIXED, COMPOSITION, 470 ohms... ± 10 pct, 1/2 w (01121)	2	
-14	118-008	. RESISTOR, VARIABLE, 0 to 100,000 ohms ..... ± 30 pct, 1 w (01113) (Supplied w/mtg hardware)	1	
-15	EB1041	. RESISTOR, FIXED, COMPOSITION, 100,000 .... ohms ± 10 pct, 1/2 w (01121)	2	
-16	EB1021	. RESISTOR, FIXED, COMPOSITION, 1000 ohms.. ± 10 pct, 1/2 w (01121)	2	
-17	HB2221	. RESISTOR, FIXED, COMPOSITION, 2200 ohms.. ± 10 pct, 2 w (01121)	2	
-18	EB3941	. RESISTOR, FIXED, COMPOSITION, 390,000 .... ohms ± 10 pct, 1/2 w (01121)	1	
-19	EB15G5	. RESISTOR, FIXED, COMPOSITION, 1.5 meg .... ± 5 pct, 1/2 w (01121)	2	
-20	GB1031	. RESISTOR, FIXED, COMPOSITION, 10,000 ..... ohms ± 10 pct, 1 w (01121)	1	
-21	FRL10-3000	. RESISTOR, FIXED, WIRE WOUND, 3000 ohms .. ± 10 pct, 10 w (94310) (ATTACHING PARTS)	1	
-22	COML	. SCREW, MACHINE, Round head, steel, nickel .. plated, No. 6-32 by 2-1/4 in. lg	1	
	2153	. WASHER, NONMETALLIC (83330)	2	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 6.....	1	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel ..... plated, No. 6-32	1	
		---*---		
-23	EB5645	. RESISTOR, FIXED, COMPOSITION, 560,000 .... ohms ± 4 pct, 1/2 w (01121)	2	
-24	EB1845	. RESISTOR, FIXED, COMPOSITION, 180,000 .... ohms ± 5 pct, 1/2 w (01121)	3	
-25	65P47304	. CAPACITOR, FIXED, PAPER DIELECTRIC, ... 47,000 uuf ± 5 pct, 400 vdcw (56289)	2	
-26	PM4S1	. CAPACITOR, FIXED, PLASTIC DIELECTRIC, .. 10,000 uuf ± 20 pct, 400 vdcw (14655)	2	
-27	4TM-S2	. CAPACITOR, FIXED, PAPER DIELECTRIC, ... 20,000 uuf ± 20 pct, 400 vdcw (56289)	1	

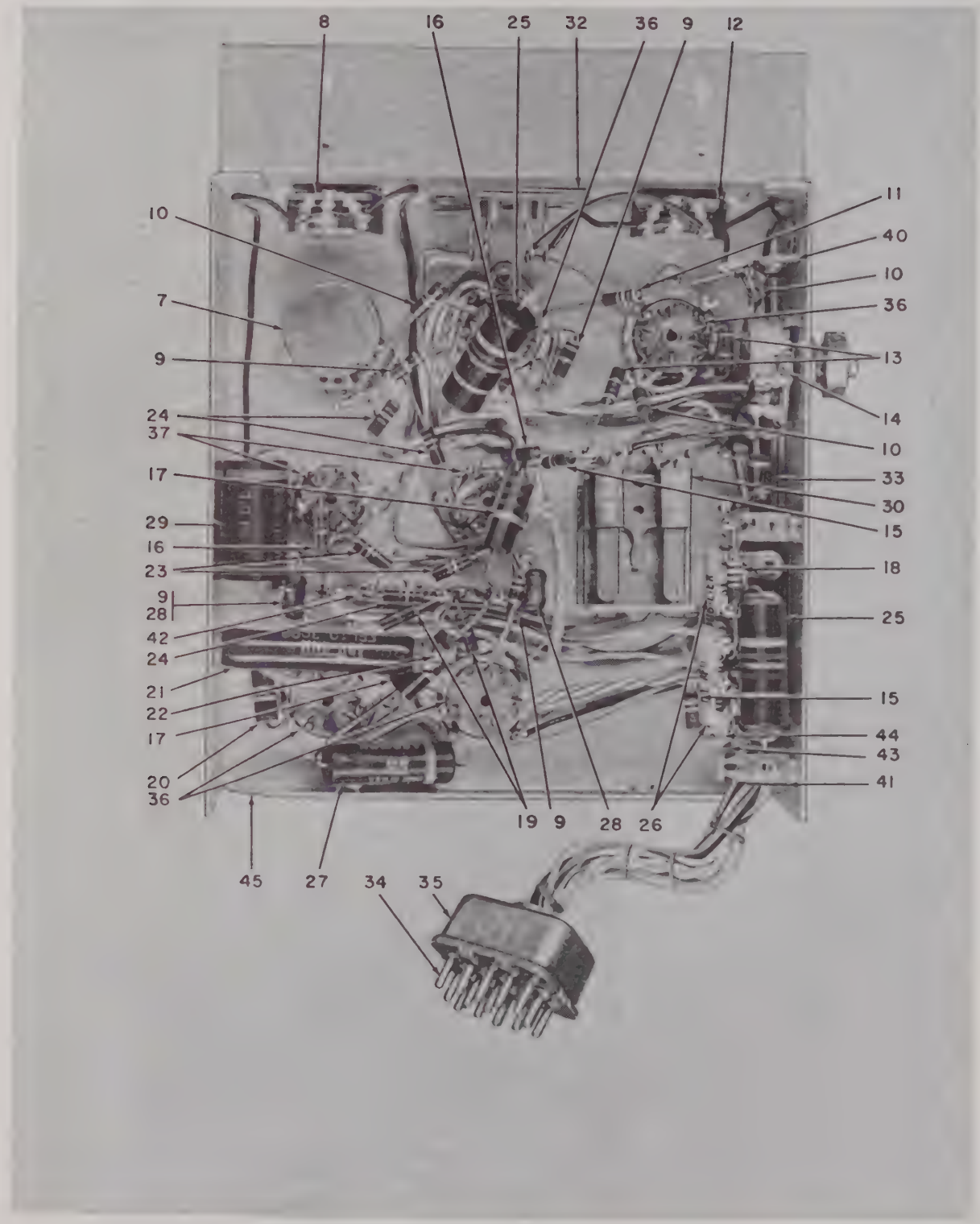


Figure 16. Amplifier-Oscillator, Type ABM-163 (Sheet 2 of 2)

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
16-28	331000C0H0759D	. CAPACITOR, FIXED, CERAMIC ..... DIELECTRIC, 7.5 uuf ± 0.5 uuf, 600 vdcw (72982)	2	
-29	P8292ZN13	. CAPACITOR, FIXED, METALLIZED PAPER ... DIELECTRIC, 1 uf ± 20 pct, 200 vdcw (00656)	1	
-30	GA11D	. RELAY, ARMATURE, DPDT, 6v dc (77342) ..... (ATTACHING PARTS)	1	
-31	COML	. SCREW, MACHINE, Binding head, steel, nickel.. plated, No. 8-32 by 3/8 in. lg	1	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 8..... ---*---	1	
-32	F126	. CONNECTOR, RECEPTACLE, ELECTRICAL, .. 6 contacts (75173)	1	
-33	2675	. CONNECTOR, RECEPTACLE, ELECTRICAL, .. 4 contacts (75173)	1	
-34	13219	. CONNECTOR, PLUG, ELECTRICAL, ... 14 contacts (75173)	1	
-35	4708	. SHELL, ELECTRICAL CONNECTOR (75173) ...	1	
-36	181-271	. SOCKET, ELECTRON TUBE (01113).....	4	
-37	181-169	. SOCKET, ELECTRON TUBE (01113)	2	
-38	774-022	. BASE, Tube lock (01113)	4	
-39	774-024	. BASE, Tube lock (01113)	2	
-40	234-401	. TERMINAL BOARD (01113)	1	
-41	234-469	. TERMINAL BOARD (01113)	1	
-42	234-460	. TERMINAL BOARD (01113)	1	
-43	774-002	. STRAP, RETAINING (01113) ..... (ATTACHING PARTS)	1	
-44	COML	. SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 6-32 by 3/8 in. lg	1	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 6	1	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel ..... plated, No. 6-32 ---*---	1	
-45	211-163	. CHASSIS ELECTRICAL EQUIPMENT (01113) ...	1	
17-	811-307	POWER SUPPLY (01113) (See figure 2-84 for ..... next higher assembly)	Ref	
-1	E3A309	. CAPACITOR, FIXED, ELECTROLYTIC, 40 uf... ± 10 pct, 450 vdcw (00656) (ATTACHING PARTS)	2	
-2	COML	. SCREW, MACHINE, Round head, steel, nickel... plated, No. 4-40 by 1/4 in. lg ---*---	4	
-3	AFH1-04	. CAPACITOR, FIXED, ELECTROLYTIC, ... 3000 uf ± 2 pct, 15 vdcw (00656)	2	

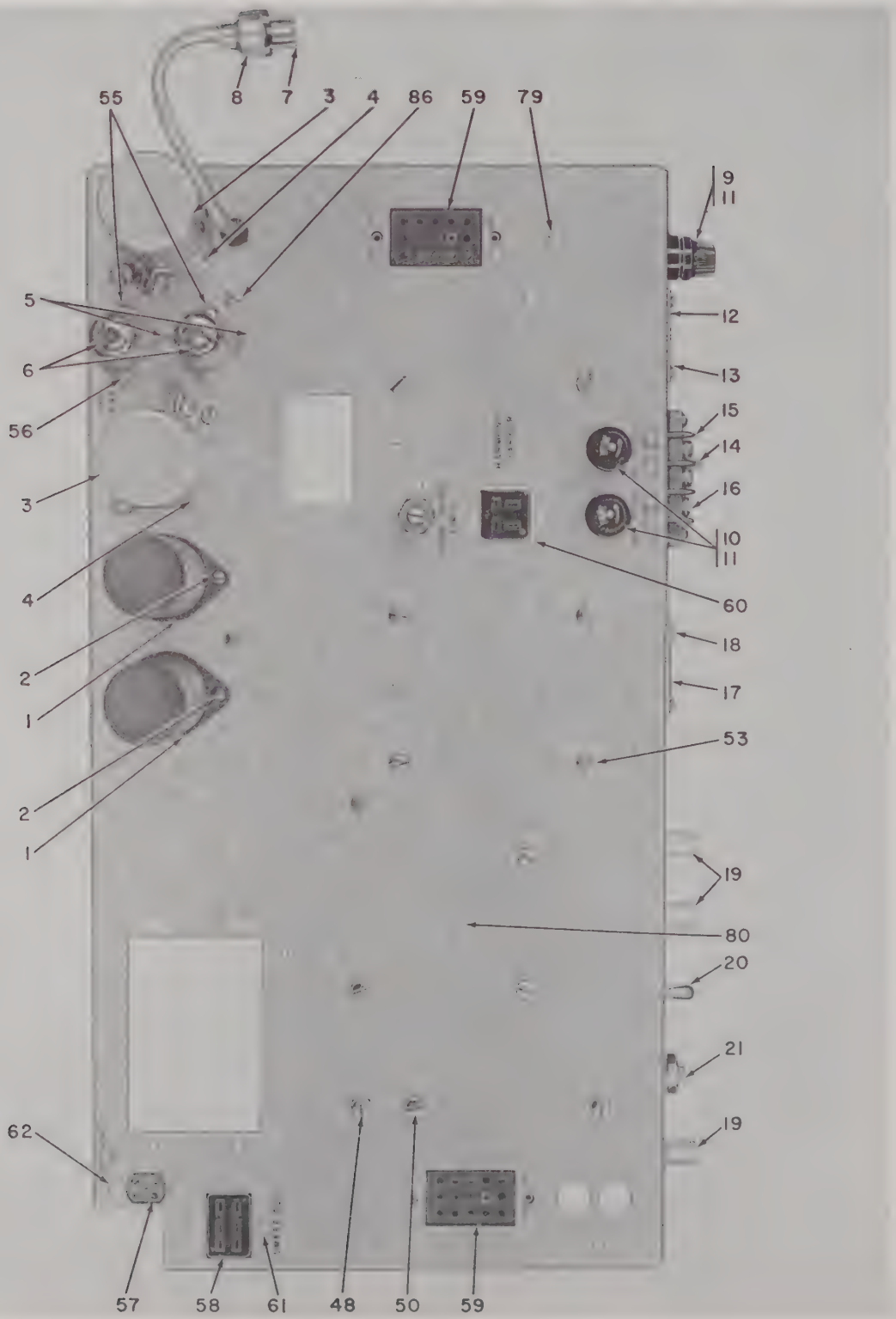


Figure 17. Power Supply (Sheet 1 of 2)

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
17-		(ATTACHING PARTS)		
-4	VR3	. RETAINER, CAPACITOR (90201) (Supplied w/mtg hardware	2	
		---*---		
-5	774-025	. RETAINER, ELECTRON TUBE (01113)	2	
-6	OA2	. ELECTRON TUBE (49956)	2	
-7	277OK	. CONNECTOR, PLUG, ELECTRICAL, 4 contacts (75173)	1	
-8	2704	. SHELL, ELECTRICAL CONNECTOR (75173)	1	
-9	312002	. FUSE, CARTRIDGE, 2 amp (75915)	1	
-10	313.100	. FUSE, CARTRIDGE, 1/10 amp (75915)	2	
-11	101-803	. FUSEHOLDER (01113) (Supplied w/mtg hardware)	3	
-12	219-195	. PLATE, INSTRUCTION (01113) (ATTACHING PARTS)	1	
-13	COML	. SCREW, TAPPING, THREAD FORMING, Hex head, steel, cadmium plated, No. 4 by 3/16 in. lg	2	
		---*---		
-14	141J	. BUS BAR (75173)	1	
-15	3-141Y	. TERMINAL BOARD (75173) (Supplied w/mtg hardware)	1	
-16	2105-05-00	. TERMINAL, LUG (78189)	1	
-17	219-204	. PLATE, IDENTIFICATION (01113) (ATTACHING PARTS)	1	
-18	COML	. RIVET, TUBULAR	2	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 5	2	
		---*---		
-19	UG-657/U	. CONNECTOR, RECEPTACLE, ELECTRICAL, 1 contact (02660) (Supplied w/mtg hardware)	3	
-20	316-63	. SWITCH, TOGGLE, DPDT (73559) (Supplied w/mtg hardware)	1	
-21	118-088	. RESISTOR, VARIABLE, 0 to 500,000 ohms ± 30 pct, 1/2 w (01113) (Supplied w/mtg hardware)	1	
-22	701-022	. TERMINAL, LUG (01113)	1	
-23	EB3301	. RESISTOR, FIXED, COMPOSITION, 33 ohms ± 10 pct, 1/2 w (01121)	3	
-24	GB4345	. RESISTOR, FIXED, COMPOSITION, 430,000 ohms ± 5 pct, 1 w (01121)	1	
-25	FRL10-300	. RESISTOR, FIXED, WIRE WOUND, 300 ohms ± 5 pct, 10 w (94310) (ATTACHING PARTS)	1	
-26	COML	. SCREW, MACHINE, Round head, steel, cadmium plated, No. 6-32 by 2-1/4 in. lg	1	
	2153	. WASHER, NONMETALLIC (83330)	2	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 6	1	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated, No. 6-32	1	
		---*---		
-27	EB7535	. RESISTOR, FIXED, COMPOSITION, 75,000 ohms ± 5 pct, 1/2 w (01121)	1	
-28	JL68831	. RESISTOR, VARIABLE, 0 to 50,000 ohms ± 30 pct, 1/2 w (01121) (Supplied w/mtg hardware)	1	
-29	1-3/4D48F17500	. RESISTOR, FIXED, WIRE WOUND, 17,500 ohms ± 5 pct, 10 w (44655)	1	
-30	FRL10-5000	. RESISTOR, FIXED, WIRE WOUND, 5,000 ohms ± 5 pct, 10 w (94310)	1	
-31	FRL10-10000	. RESISTOR, FIXED, WIRE WOUND, 10,000 ohms ± 5 pct, 10 w (94310)	1	

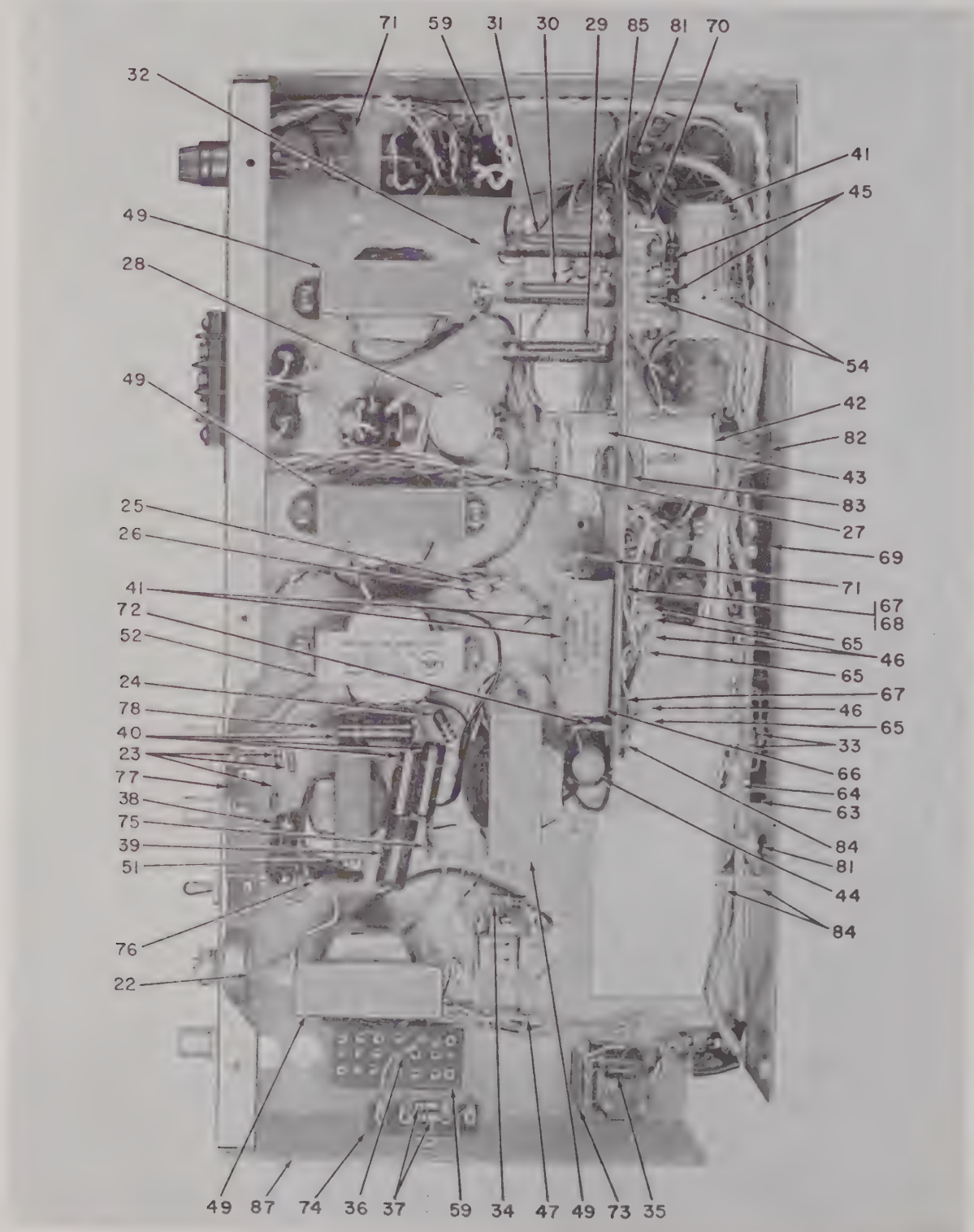


Figure 17. Power Supply (Sheet 2 of 2)

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
17-		(ATTACHING PARTS)		
-32	COML	. SCREW, MACHINE, Round head steel, nickel.... plated, No. 6-32 by 2-1/4 in. lg	3	
	2153	. WASHER, NONMETALLIC (83330).....	6	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 6	6	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated, .. No. 6-32	3	
		---*---		
-33	EB2201	. RESISTOR, FIXED, COMPOSITION, 22 ohms.... ±10 pct, 1/2 w (01121)	2	
-34	GB1005	. RESISTOR, FIXED, COMPOSITION, 10 ohms ... ±5 pct, 1 w (01121)	1	
-35	EB33G5	. RESISTOR, FIXED, COMPOSITION, 3.3 meg.... ±5 pct, 1/2 w (01121)	1	
-36	EB2241	. RESISTOR, FIXED, COMPOSITION, 220,000 .... ohms ±10 pct, 1/2 w (01121)	1	
-37	EB1041	. RESISTOR, FIXED, COMPOSITION, 100,000 .... ohms ±10 pct, 1/2 w (01121)	2	
-38	TMP1	. CAPACITOR, FIXED, PAPER DIELECTRIC, ... 100,000 uuf ±10 pct, 200 vdcw (56289)	1	
-39	P88N215B	. CAPACITOR, FIXED, METALLIZED PAPER ... DIELECTRIC, 100,000 uuf ±10 pct, 400 vdcw (00656)	1	
-40	NO NUMBER	. CAPACITOR, FIXED, METALLIZED PAPER ... DIELECTRIC, 20,000 uuf ±10 pct, 400 vdcw (These items to be selected when calibration of Transformer T2 is necessary)	3	
-41	6YDC	. CAPACITOR, FIXED, ELECTROLYTIC, ... 1500 uf ±5 pct, 6 vdcw (72699)	3	
-42	AFH2-40	. CAPACITOR, FIXED, ELECTROLYTIC, ... 30 uf ±2 pct, 50 uf ±2 pct, 350 vdcw (00656)	1	
		(ATTACHING PARTS)		
-43	VR3	. RETAINER, CAPACITOR (90201) (Supplied ..... w/mtg hardware)	1	
		---*---		
-44	BR445	. CAPACITOR, FIXED, ELECTROLYTIC, ... 4 uf ±2 pct, 450 vdcw (14655)	1	
-45	HC30	. SEMICONDUCTOR DEVICE, DIODE (13327)	2	
-46	STCER72	. SEMICONDUCTOR DEVICE, DIODE (13327)	3	
-47	GA11D	. RELAY, ARMATURE, DPDT (77342).....	1	
		(ATTACHING PARTS)		
-48	COML	. SCREW, MACHINE, Binding head, steel, nickel.. plated, No. 6-32 by 3/8 in. lg	1	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 6	1	
		---*---		
-49	C2304	. REACTOR (97965).....	4	
		(ATTACHING PARTS)		
-50	COML	. SCREW, MACHINE, Binding head, steel, nickel.. plated, No. 8-32 by 3/8 in. lg	8	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 8	8	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel plated,... No. 8-32	8	
		---*---		
-51	6P321	. TRANSFORMER, AUDIO FREQUENCY (83325)..	1	
-52	141-192	. TRANSFORMER, AUDIO FREQUENCY (01113)..	1	
		(ATTACHING PARTS)		
-53	COML	. SCREW, MACHINE, Binding head, steel, nickel.. plated, No. 6-32 by 3/8 in. lg	4	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
17-	COML	. WASHER, LOCK, Steel, nickel plated, No. 6	4	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel ..... plated, No. 6-32	4	
		---*---		
-54	181-169	. SOCKET, ELECTRON TUBE (01113)	2	
-55	774-024	. BASE, Tube lock (01113)	2	
		(ATTACHING PARTS)		
-56	COML	. RIVET, TUBULAR	4	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 5	4	
		---*---		
-57	2675	. CONNECTOR, RECEPTACLE, ELECTRICAL, .. 4 contacts (75173)	1	
-58	S306AB	. CONNECTOR, RECEPTACLE, ELECTRICAL, .. 6 contacts (75173)	1	
-59	13220	. CONNECTOR, RECEPTACLE, ELECTRICAL, .. 14 contacts (75173)	2	
-60	S304AB	. CONNECTOR, RECEPTACLE, ELECTRICAL, .. 4 contacts (75173)	1	
		(ATTACHING PARTS)		
-61	COML	. RIVET, TUBULAR	4	
-62	COML	. RIVET, TUBULAR	10	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 5	14	
		---*---		
-63	10-170	. TERMINAL BOARD (75173).....	1	
		(ATTACHING PARTS)		
-64	COML	. SCREW, MACHINE, Round head, steel, ... nickel plated, No. 4-40 by 1/2 in. lg	2	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 4	2	
	COML	. NUT, PLAIN, HEXAGON, Steel, nickel ..... plated, No. 4-40	2	
		---*---		
-65	099067	. HOLDER, SEMICONDUCTOR DEVICE (75915) ..	3	
		(ATTACHING PARTS)		
-66	COML	. RIVET, TUBULAR.....	3	
		---*---		
-67	099067-3	. INSULATOR, PLATE (75915)	3	
-68	238-191	. INSULATOR, PLATE (01113)	1	
-69	238-181	. INSULATOR, PLATE (01113)	1	
-70	CJ53B	. TERMINAL BOARD (75173)	1	
-71	234-419	. TERMINAL BOARD (01113)	2	
-72	234-413	. TERMINAL BOARD (01113)	1	
-73	234-416	. TERMINAL BOARD (01113)	1	
-74	234-418	. TERMINAL BOARD (01113)	1	
-75	CJ54C	. TERMINAL BOARD (75173)	1	
-76	234-443	. TERMINAL BOARD (01113)	1	
-77	234-417	. TERMINAL BOARD (01113)	1	
-78	234-423	. TERMINAL BOARD (01113)	1	
		(ATTACHING PARTS)		
-79	COML	. RIVET, TUBULAR.....	5	
-80	COML	. RIVET, TUBULAR.....	1	
	COML	. WASHER, LOCK, Steel, nickel plated, No. 5	6	
		---*---		
-81	3342	. GROMMET, RUBBER (04941)	2	
-82	294-002	. GROMMET, RUBBER (01113)	1	
-83	294-004	. GROMMET, RUBBER (01113)	1	
-84	2106-06-00	. TERMINAL, LUG (78189)	4	
-85	214-319	. BRACKET, ANGLE (01113)	1	
		(ATTACHING PARTS)		
-86	COML	. SCREW, MACHINE, Binding head, steel, ... nickel plated, No. 6-32 by 1/4 in. lg	2	
		---*---		
-87	211-169	. CHASSIS, ELECTRICAL EQUIPMENT (01113) ..	1	

SECTION III

NUMERICAL INDEX

PART NUMBER	STOCK NUMBER	FIG. & INDEX NO.	QTY PER ART	SOURCE CODE	REPAIR CODE
AA1110-10		8-13	1		
AA335-5		10-16	1		
AFH1-04		17-3	2		
AFH2-40		17-42	1		
AN504-4R3		2-2	4		
BBR12-150		14-22	2		
BOLT 1/4-20X 1/2		4-28	4		
BR445		17-44	1		
CAPACITOR		17-40	3		
CA10002		5-39	1		
CR1015		13-39	2		
CJ53B		17-70	1		
CJ54C		17-75	1		
CM15E121J		15-31	2		
CM15E151J		15-25	2		
CM15E161J		15-27	1		
CM15E300J		15-28	1		
C2304		17-49	4		
C4886-4A		8-49	1		
D6-202		14-28	1		
D6-390		15-26	1		
EB1011	5905-581-2786	3-8	2		
		11-9			
EB1021	5905-539-3204	7-4	10		
		14-9			
		15-17			
		16-16			
EB1035		15-14	2		
EB1041		15-11	9		
		16-15			
		17-37			
EB1045		13-5	4		
		14-10			
EB1051	5905-578-0913	15-20	2		
EB1061		5-50	1		
EB1345		5-52	1		
EB15G5		16-19	2		
EB1515		15-18	3		
EB1541	5905-257-6569	16-10	3		
EB1845		16-24	3		
EB1851		5-46	1		
EB22G1		15-12	1		
EB2201		17-33	2		
EB2205		14-18	1		
EB2241	5905-593-3213	3-7	2		
		17-36			
EB2745		14-19	2		
EB3015	5905-278-1646	3-6	4		
		13-4			
EB3035		14-16	2		
EB3055		5-49	1		
EB33G1		16-9	4		
EB33G5		17-35	1		
EB3301	5905-552-6122	17-23	3		
EB3305		2-30	3		
EB3351		5-47	1		
EB3941		16-18	1		
EB4701		14-20	2		
EB4711		16-13	2		
EB4721	5905-193-2206	11-18	1		
EB4725	5905-556-5256	8-88	1		
EB4731		14-11	2		
		15-21			
EB4741		16-11	1		
EB4751		5-51	1		
EB51G5		13-13	2		

PART NUMBER	STOCK NUMBER	FIG. & INDEX NO.	QTY PER ART	SOURCE CODE	REPAIR CODE
EB5105		15-16	2		
EB5125		14-13	1		
EB5135		15-19	2		
EB5145	5905-581-3461	14-17	2		
EB5621	5905-192-4408	7-5	1		
EB5635		15-13	1		
EB5641		5-48	4		
		14-21			
EB5645		16-23	2		
EB5651		5-45	1		
EB7535		17-27	1		
ED.01		14-30	5		
		15-24			
E3A309		17-1	2		
FF312		9-11	4		
		9-22			
FRL10-10000		17-31	1		
FRL10-300		17-25	1		
FRL10-3000		16-21	1		
FRL10-5000		17-30	1		
FTSM2		15-9	2		
F126		16-32	1		
F605 5000.000KC		15-5	1		
GA11D		14-34	3		
		16-30			
		17-47			
GB1005		17-34	1		
GR1031		16-20	1		
GB1535		14-14	1		
GB4345		17-24	1		
GB7535		14-12	1		
GE2P		5-11	8		
HB1521		14-15	2		
HB2221		16-17	2		
HC30		17-45	2		
HFT65A		13-43	2		
H1K60		15-29	6		
JA2N056P104AA		5-28	1		
JL68831		17-28	1		
JL68833A		15-15	1		
J82182		5-44	1		
LC026B7		10-10	1		
MAC5		11-8	1		
MD19152J		14-25	1		
MD20128G		14-26	1		
MM2-100MA		5-21	1		
M61		5-22	1		
NUT 1/2-32		2-44	1		
NUT 1/4-20		4-29	4		
NUT 1/4-32		3-11	2		
NUT 10-32		4-25	6		
NUT 10-32		8-66	5		
		12-2			
		13-24			
NUT 12		4-2	22		
		4-12			
		4-16			
		4-20			
NUT 12-24		4-9	2		
NUT 12-24		4-33	4		
NUT 3/8-24		5-7	3		
		5-39			
NUT 3/8-24		8-40	1		
NUT 4		4-22	2		
NUT 4-40		8-110	1		
NUT 4-40		14-38	5		
		15-7			
		17-64			

PART NUMBER	STOCK NUMBER	FIG. & INDEX NO.	QTY PER ART	SOURCE CODE	REPAIR CODE
NUT 6-32		2-29	26		
		2-34			
		2-64			
		2-74			
		5-63			
		5-69			
		8-70			
		13-38			
		14-55			
		16-22			
		16-44			
		17-26			
		17-53			
NUT 8-32		2-88	12		
		17-50			
PIN 1/16X3/16		8-116	2		
PIN 1/8X1/2		8-28	1		
PIN 1/8X3/8		8-29	1		
PIN 3/32X3/8		8-35	1		
PM4S1		16-26	2		
PS283-233		6-4	2		
P145A64		12-3	1		
P304CCT		6-12	2		
		15-10			
P306CCT		8-48	1		
P315FHT		12-11	1		
P8292ZN11A		13-12	7		
		14-24			
P8292ZN13		16-29	1		
P88N20000MMF 200-10		14-23	1		
P88N2000MMF 200-5		5-53	1		
P88N215B		17-39	1		
RESISTOR		13-14	2		
RG-55A/U		2-11	2		
RG-55A/U		2-12	1		
RG-55A/U		2-13	1		
RG-55A/U		2-14	2		
RG-55A/U		2-20	1		
RG-55A/U		8-45	1		
RG-55A/U		8-46	1		
RG-55A/U		8-47	1		
RG-58/U		2-15	1		
RG-58/U		2-17	1		
RING		6-24	1		
RIVET		14-48	10		
		15-65			
RIVET		5-55	44		
		11-23			
		12-20			
		14-45			
		14-52			
		15-54			
		15-66			
		17-18			
		17-56			
		17-61			
		17-80			
RIVET		12-13	22		
		17-62			
		17-66			
		17-79			
RPN4-40-5C		5-	4		
SCREW 1/4X1/2		2-38	3		
		2-41			
SCREW 10-32X 1/2		2-36	6		
SCREW 10-32X 1/2		4-24	6		
SCREW 10-32X 1/2		8-106	2		
		13-23			
SCREW 10-32X 1/4		9-6	2		
SCREW 10-32X 1-1/2		2-39	2		
SCREW 10-32X2		2-22	4		
SCREW 10-32X 3/8		2-50	8		
		12-2			
SCREW 10-32X 3/8		8-15	12		
		8-26			
		8-31			
		8-121			
SCREW 12-24X1		2-8	6		
		4-1			
SCREW 12-24X 1/2		2-7	8		
		4-11			
SCREW 12-24X 1/2		4-7	18		
		4-14			
		4-18			
SCREW 12-24X 3/4		4-31	4		
SCREW 2-56X 1/4		8-10	3		
		13-36			
SCREW 2-56X 3/16		3-22	9		
		8-93			
		8-112			
		13-16			
SCREW 2-56X 3/8		13-35	1		
SCREW 2-56X 9/16		6-19	2		
SCREW 2-56X 9/16		13-48	1		
SCREW 3-48X 3/16		11-21	1		
SCREW 4-40X 1/2		15-7	3		
		17-64			
SCREW 4-40X 1/4		3-20	19		
		5-10			
		7-2			
		14-38			
		17-2			
SCREW 4-40X 1/4		8-98	4		
SCREW 4-40X 1/4		10-13	2		
SCREW 4-40X 3/16		3-4	7		
		8-86			
SCREW 4-40X 3/16		8-99	1		
SCREW 4-40X 3/16		8-55	25		
		8-57			
		8-91			
		10-4			
		10-9			
SCREW 4-40X 3/4		8-101	2		
SCREW 4-40X 3/8		3-5	8		
SCREW 4-40X 3/8		8-50	5		
		13-31			
SCREW 4-40X 5/16		3-3	6		
		3-18			
SCREW 4X3/16		2-59	27		
		2-69			
		5-15			
		5-30			
		13-26			
		13-57			
		17-13			
SCREW 4X3/8		13-20	2		
		13-22			
SCREW 5-40X 1-5/8		6-2	2		
SCREW 6-32X 1/2		5-19	4		
SCREW 6-32X 1/2		5-61	2		

PART NUMBER	STOCK NUMBER	FIG. & INDEX NO.	QTY PER ART	SOURCE CODE	REPAIR CODE
SCREW 6-32X 1/4		6-7	18		
		8-19			
		8-53			
		8-62			
		8-81			
		9-2			
		13-50			
		17-86			
SCREW 6-32X 1/4		13-7	1		
SCREW 6-32X 2-1/4		16-22	5		
		17-26			
		17-32			
SCREW 6-32X 3/4		8-72	3		
SCREW 6-32X 3/4		8-68	11		
		13-9			
		13-11			
SCREW 6-32X 3/8		2-27	50		
		2-32			
		2-48			
		2-54			
		2-56			
		2-61			
		2-67			
		2-71			
		2-76			
		2-78			
		5-63			
		11-2			
		11-6			
		12-16			
		13-53			
		14-55			
		16-44			
		17-48			
		17-53			
SCREW 6-32X 3/8		2-62	11		
		2-72			
		2-83			
		5-7			
		5-69			
SCREW 6-32X 3/8		10-2	1		
SCREW 6-32X 5/8		6-14	4		
SCREW 6X1/4		2-66	2		
SCREW 6X1/4		6-10	3		
		13-55			
SCREW 8-32X 1/2		2-86	4		
SCREW 8-32X 1/4		12-8	8		
SCREW 8-32X 3/8		2-51	29		
		2-85			
		9-10			
		9-13			
		12-10			
		14-35			
		16-31			
		17-50			
SETSCREW 1/4-28X3/8		8-58	2		
SETSCREW 10-32		8-65	2		
SETSCREW 4-40 X5/16		8-109	1		
SETSCREW 6-32 X3/16		3-29	3		
		5-37			
SETSCREW 6-32 X3/16		13-29	2		
SETSCREW 8-32 X3/16		9-20	2		
SETSCREW 8-32 X3/16		8-33	5		
		8-83			

PART NUMBER	STOCK NUMBER	FIG. & INDEX NO.	QTY PER ART	SOURCE CODE	REPAIR CODE
SETSCREW 8-32 X5/16		8-32	1		
SETSCREW 8-32 X5/16		10-15	1		
SR6P		2-81	1		
STCER72		17-46	3		
S304AB		17-60	1		
S306AB		17-58	1		
S315EB		12-12	2		
TCZ1		15-36	2		
TCZ1R5		15-23	2		
TCZ20		15-30	1		
TCZ24		15-22	2		
TCZ3R3		15-32	1		
THUMBSCREW 10-32X3/16		2-5	2		
TMP1		17-38	1		
TR53		2-3	2		
		3-1			
T110B63		5-27	1		
UG-657/U		3-14	22		
		5-58			
		6-27			
		7-11			
		13-3			
		14-39			
		15-56			
		17-19			
UG-88/U		2-9	5		
		2-18			
		2-90			
		8-43			
VR3		17-4	3		
		17-43			
WASHER 1/2		2-45	1		
WASHER 1/4		4-32	4		
WASHER 1/4		14-41	3		
WASHER 1/4		15-58	3		
WASHER 10		2-40	2		
WASHER 10		2-52	2		
WASHER 10		8-107	6		
		9-7			
		12-2			
WASHER 12		4-8	18		
		4-15			
		4-19			
WASHER 2		13-16	2		
WASHER 3		11-21	11		
		14-48			
		15-66			
WASHER 3/8		3-15	4		
WASHER 3/8		5-7	2		
WASHER 4		8-51	6		
		14-38			
		15-7			
		17-64			
WASHER 5		5-55	49		
		11-23			
		14-45			
		14-52			
		15-54			
		15-66			
		17-18			
		17-56			
		17-62			
WASHER 6		2-28	58		
		2-33			
		2-63			
		2-73			
		2-79			
		5-63			
		6-8			
		6-15			
		8-63			
		8-69			

PART NUMBER	STOCK NUMBER	FIG. & INDEX NO.	QTY PER ART	SOURCE CODE	REPAIR CODE
WASHER 6		8-74			
		9-3			
		11-2			
		13-7			
		13-11			
		13-38			
		14-55			
		16-22			
		16-44			
		17-26			
		17-53			
WASHER 6		8-75	7		
		13-50			
WASHER 8		2-87	18		
		12-10			
		14-35			
		16-31			
		17-50			
XLR3-32		14-37	1		
0A2		17-6	2		
0536-000-4R		13-17	7		
		15-34			
0557-000UP20-34R		14-32	1		
099067		17-65	3		
099067-3		17-67	3		
1-3/4D48F17500		17-29	1		
1N87		15-37	3		
10-170		17-63	1		
1000-002		11-15	1		
1000-101		13-27	1		
1000-102		13-28	1		
1000-103		13-44	1		
1000-104		13-45	4		
1000-105		3-27	1		
1000-106		3-26	2		
		3-28			
1000-108		5-70	1		
1000-109		5-71	1		
1000-110		5-	1		
1000-111		5-	1		
1000-112		2-	1		
1000-113		2-19	2		
		8-44			
1000-114		2-24	1		
1000-115		2-25	1		
1000-116		2-	1		
1000-117		2-92	1		
1000-118		8-41	1		
1000-119		8-	1		
1000-121		8-67	1		
1000-122		8-79	1		
1000-123		8-80	1		
1000-124		8-87	1		
1001-101		4-	1		
1001-102		4-5	1		
1001-103		4-3	1		
1001-104		4-4	1		
1001-105		4-23	2		
1001-106		4-27	2		
1001-107		4-34	1		
1001-108		4-6	2		
1001-109		4-10	2		
1001-110		4-13	2		
1001-111		4-17	2		
1001-112		4-21	2		
1001-113		4-26	2		
1001-114		4-30	4		
1002-001		11-10	1		
101		2-57	3		
		3-9			
101-803		17-11	3		
102		5-65	3		
		13-51			

PART NUMBER	STOCK NUMBER	FIG. & INDEX NO.	QTY PER ART	SOURCE CODE	REPAIR CODE
102-501		8-9	2		
1065		8-20	1		
107-004		5-5	1		
111406		2-	1		
118-008		16-14	1		
118-047		5-33	5		
118-080		5-42	1		
118-081		5-41	1		
118-082		5-72	1		
118-083		16-7	1		
118-084		5-26	1		
118-085		5-24	1		
118-087		16-12	1		
118-088		17-21	1		
118-090		16-8	1		
12AT7	5960-615-5584	16-4	1		
12AY7		14-5	1		
12358		5-23	1		
128-203		8-103	1		
128-204		8-100	1		
131-501		11-13	1		
13219		14-7	2		
		16-34			
13220		17-59	2		
139-102		7-9	4		
		15-38			
139-106		3-24	2		
139-107		13-33	2		
139-111		13-32	2		
141-192		17-52	1		
141J		17-14	1		
1496		3-12	2		
156-089		11-11	3		
156-440		15-46	1		
156-441		15-47	1		
156-442		15-43	2		
156-442A		15-42	1		
156-443		15-44	1		
156-444		15-41	1		
156-445		15-40	1		
156-446		15-39	1		
156-457		15-49	1		
156-458		15-45	1		
156-459		15-50	1		
156-460		15-51	1		
156-461		15-48	1		
161-124		10-12	1		
181-145		14-44	2		
		15-53			
181-169		16-37	4		
		17-54			
181-241		14-43	4		
		15-52			
181-271		16-36	4		
182-101		15-8	1		
183-222		2-10	1		
184-018		8-18	1		
2N1224		14-1	2		
201-022		13-47	1		
203-115		2-21	2		
205-007		8-16	1		
2105-05-00		17-16	1		
2106-06-00		6-11	10		
		12-17			
		14-46			
		17-84			
211-163		16-45	1		
211-164		5-35	1		
211-165		15-68	1		
211-168		14-56	1		
211-169		17-87	1		
212-151		13-58	1		
212-329		10-3	1		
212-370		8-90	1		

PART NUMBER	STOCK NUMBER	FIG. & INDEX NO.	QTY PER ART	SOURCE CODE	REPAIR CODE
212-371		2-68	1		
212-382		5-29	1		
212-383		11-4	1		
212-385		11-24	1		
212-386		2-58	1		
213-329		2-46	1		
213-333		10-8	1		
213-337		8-54	1		
213-340		12-15	1		
213-341		13-54	1		
213-342		5-57	1		
214-090		5-68	1		
214-092		3-19	1		
214-094		13-56	3		
214-238		14-53	2		
214-289		8-122	1		
214-290		8-71	3		
214-298		5-20	2		
214-299		6-6	1		
214-305		12-21	1		
214-311		12-18	1		
214-312		12-19	1		
214-313		13-52	1		
214-314		12-5	1		
214-315		12-6	1		
214-318		5-62	1		
214-319		17-85	1		
214-326		2-82	1		
214-328		9-1	1		
215-124		13-42	1		
215-148		5-14	2		
2153		5-59	6		
		16-22			
		17-26			
216-134		5-73	1		
2162		5-67	2		
216562A		6-25	1		
218-008		3-16	1		
218-011		6-18	1		
218-030		8-84	1		
219-195		17-12	1		
219-204		17-17	1		
219-231		8-7	1		
22-3		11-14	1		
220-007		6-22	2		
221-094		8-118	1		
221-095		8-108	1		
221-096		8-113	1		
221-099		8-95	1		
221-110		3-10	2		
221-135		8-30	1		
221-187		8-4	1		
221-189		10-14	1		
221-190		8-39	1		
221-191		2-43	1		
221-192		8-97	1		
221-197		8-73	3		
221-198		9-12	4		
221-201		7-3	1		
221-202		5-38	1		
221-218		10-1	1		
221-219		8-22	1		
221-220		8-23	1		
222-115		3-23	1		
222-116		3-2	1		
222-117		13-30	1		
222-118		13-34	2		
222-124		6-28	1		
222-125		6-13	1		
222-146		9-23	1		
222-148		12-9	2		
222-149		12-4	1		
222-151		7-12	1		
224-004		15-6	1		
224-010		6-21	2		
224-011		6-26	1		
224-014		8-117	2		
224-020		8-102	1		
224-030		8-60	2		
224-031		8-61	2		
224-033		8-5	1		
224-034		9-18	2		
225-011		13-10	2		
225-020		10-7	2		
225-021		11-5	4		
226-017		2-23	4		
226-019		8-36	1		
226-020		8-82	4		
226-021		8-24	1		
226-024		9-15	1		
228-105		3-30	1		
228-123		7-1	1		
228-130		8-120	1		
228-131		8-85	1		
228-132		8-77	1		
228-133		8-64	1		
228-134		8-123	1		
228-136		10-17	1		
228-138		9-9	1		
228-139		8-3	1		
229-108		6-20	1		
229-109		8-119	1		
229-110		8-27	1		
229-118		3-25	2		
229-124		8-105	1		
229-125		5-36	1		
231-125		8-94	4		
231-143		5-13	2		
232-033		13-48	1		
232-036		13-21	1		
232-037		13-19	1		
232-073		8-38	1		
232-086		5-12	2		
232-087		5-18	1		
232-088		5-17	2		
		8-111			
232-188		2-77	4		
233-007		10-11	1		
234-400		14-49	3		
		15-61			
234-401		13-6	2		
		16-40			
234-413		17-72	1		
234-416		17-73	1		
234-417		2-31	3		
		15-63			
		17-77			
234-418		17-74	1		
234-419		14-51	4		
		15-64			
		17-71			
234-423		17-78	1		
234-427		5-54	2		
		15-62			
234-443		17-76	1		
234-460		16-42	1		
234-469		14-50	5		
		16-41			
234-473		7-10	7		
		15-60			
237-003		5-16	1		
238-146		8-96	1		
238-148		8-104	1		
238-181		17-69	1		
238-191		17-68	1		
239-021		8-1	1		
239-024		5-1	10		
239-026		5-2	1		

PART NUMBER	STOCK NUMBER	FIG. & INDEX NO.	QTY PER ART	SOURCE CODE	REPAIR CODE
239-030		5-3	2		
		8-2			
239-034		5-4	1		
263TC		13-18	3		
		15-59			
2675		16-33	2		
		17-57			
2704		13-2	2		
		17-8			
271-101		14-2	2		
		15-2			
271-102		14-3	4		
		15-1			
273-003		6-3	4		
273-004		6-5	2		
273-005		6-1	1		
273-010		8-78	4		
273-012		8-6	1		
273-013		5-40	1		
275-011		5-9	1		
275-012		5-8	1		
2770K		13-1	2		
		17-7			
278-019		8-34	1		
278-021		8-11	1		
278-022		9-14	1		
278-023		8-115	2		
278-024		9-19	1		
278-025		9-17	1		
278-028		9-4	1		
278-029		9-8	1		
282-003		13-49	2		
294-002		17-82	1		
294-004		5-34	3		
		17-83			
296-001		15-7	1		
3-141Y		17-15	1		
301000C0K0758C		15-33	1		
302-2		2-42	2		
304-7		8-42	2		
31-206		2-16	3		
		2-91			
312002		17-9	1		
313.100		17-10	2		
316-63		5-56	5		
		12-14			
		14-36			
		17-20			
331000C0H0759D		16-28	2		
331000C0K0159C		11-7	1		
331000U2M250K		7-8	1		
331000U2M331J		5-32	4		
331000U2M470K		15-35	4		
3312		14-47	2		
3342		15-67	3		
		17-81			
3501FP		14-40	7		
		15-57			
3502		5-31	4		
37TC		13-41	1		
370FA		11-20	1		
4TM-S2		16-27	1		
430		11-16	2		
464		14-29	1		
466		14-27	1		
469		14-31	1		
47		8-8	2		
4700CB		13-15	2		
4700CH		3-21	2		
		13-40			
4708		14-8	2		
		16-35			
5100-100		8-12	1		

PART NUMBER	STOCK NUMBER	FIG. & INDEX NO.	QTY PER ART	SOURCE CODE	REPAIR CODE
5133-25		8-37	6		
		8-59			
		9-16			
5205		12-7	2		
6AU6		14-4	3		
		16-5			
6CB6		15-4	1		
6CW5		16-6	2		
6P321		17-51	1		
6YDC		17-41	3		
616-001		11-3	AR		
643-015		8-114	AR		
65P47304		14-33	3		
		16-25			
650377		2-1	1		
655-058		2-	2		
655-059		2-	1		
655-060		2-	1		
655-061		2-	2		
655-062		2-	1		
659-109		8-	1		
659-116		2-80	1		
659-120		2-	1		
659-121		8-	1		
659-122		8-	1		
659-126		8-	1		
69001-0500		7-6	1		
6922		15-3	3		
		16-3			
701-003		8-52	2		
		10-5			
701-008		5-66	3		
		7-7			
701-011		11-22	5		
		15-55			
701-022		5-25	9		
		17-22			
701-047		5-43	1		
71542		12-1	1		
730-003-2		8-76	3		
7308		14-6	1		
750-009		6-16	1		
752-008		11-9	1		
752-018		6-17	1		
753-109		3-13	4		
754-005		8-17	1		
773-109-1		8-21	1		
774-002		14-54	2		
		16-43			
774-022		16-1	8		
		16-38			
774-024		16-39	4		
		17-55			
774-025		17-5	2		
774-034		16-2	2		
78		2-26	4		
		5-64			
		6-9			
810-110		13-37	1		
810-247		3-17	1		
811-111		13-25	1		
811-113		13-8	1		
811-122		11-17	1		
811-123		13-46	3		
811-233		8-	1		
811-236		8-56	1		
811-239		8-25	1		
		10-			
811-247		6-23	1		
811-250		10-6	1		
811-253		9-5	1		
811-258		9-21	1		
811-259		8-14	1		
		9-			

PART NUMBER	STOCK NUMBER	FIG. & INDEX NO.	QTY PER ART	SOURCE CODE	REPAIR CODE
811-265		8-17-	1		
811-307		2-84	1		
811-308		2-35	1		
811-309		2-49	1		
811-310		2-75	1		
811-311		2-47	1		
811-312		2-70	1		
811-313		2-65	1		
811-314		2-60	1		
811-315		2-55 5-60 7-13-	2		
812-024		2-6	1		
813-162		11-1	1		
815-107		8-92	1		
815-124		2-37	1		
822-042		5-6	1		
822-048		2-4	1		
823-018		8-89	5		
823-021		11-12 14-42	2		
835		2-53	2		
841		2-89	1		

SECTION IV

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIGURE & INDEX NO.	PART NUMBER
AT1	5-5	107-004
AT2	3-1	TR53
AT3	2-25	1000-115
AT4	2-3	TR53
CP1 thru CP3	8-44	1000-113
CP201	2-19	1000-113
CR1 thru CR3	17-46	STCER72
CR4	17-45	HC30
CR5	17-45	HC30
CR101	3-24	139-106
CR102	3-24	139-106
CR401	15-37	1N87
CR402	15-38	139-102
CR403	15-37	1N87
CR404	15-38	139-102
CR405	15-37	1N87
CR406	15-38	139-102
CR701	13-33	139-107
CR702	13-33	139-107
CR703	13-32	139-111
CR704	15-38	139-102
CR801	7-9	139-102
CR901	3-24	139-106
CR902	3-24	139-106
C1	12-3	P145A64
C2	17-1	E3A309
C3	17-1	E3A309
C4	17-44	BR445
C5	17-42	AFH2-40
C8	17-38	TMP1
C9	17-39	P88N215B
C10	17-41	6YDC
C11	17-41	6YDC
C12	17-3	AFH1-04
C13	17-3	AFH1-04
C14	17-41	6YDC
C20 thru C23	5-32	331000U2M331J
C25	5-53	P88N2000MMF200-5
C26A	17-40	CAPACITOR
C26B	17-40	CAPACITOR
C27	17-40	CAPACITOR
C101	3-28	1000-106
C102	3-26	1000-105
C103	3-21	4700CH
C201	11-15	1002-002
C202	11-20	370FA
C203	11-17	811-122
C204	11-7	331000C0K0159C
C205	11-8	MAC5
C206	11-10	1002-001
C301	16-26	PM4S1
C302	16-26	PM4S1
C303	16-25	65P47304
C304	16-25	65P47304
C305	16-29	P8292ZN13
C306	16-28	331000C0H0759D
C307	16-28	331000C0H0759D
C308	16-27	4TM-S2
C401	15-29	H1K60
C402	15-31	CM15E121J
C403	15-31	CM15E121J
C404	15-32	TCZ3R3
C405	15-30	TCZ20
C406	15-29	H1K60
C407	15-29	H1K60
C408	15-35	331000U2M470K
C409	15-35	331000U2M470K
C410	13-17	0536-000-4R
C415	15-34	0536-000-4R
C416	15-35	331000U2M470K
C417	15-33	301000C0K0758C
C418	15-26	D6-390
C419	15-27	CM15E161J
C420	15-25	CM15E151J
C421	15-24	ED.01
C422	15-24	ED.01
C423	15-28	CM15E300J
C424	15-25	CM15E151J
C425	15-23	TCZ1R5
C426	15-24	ED.01
C427	15-22	TCZ24
C428	15-22	TCZ24
C429	15-36	TCZ1
C430	15-24	ED.01
C431	15-23	TCZ1R5
C432	15-36	TCZ1
C433	15-35	331000U2M470K
C434	15-34	0536-000-4R
C435 thru C437	15-29	H1K60
C501	14-22	BBR12-150
C502	14-32	0557-000UP20-34R
C503	14-22	BBR12-150
C504	14-31	469
C507	14-24	P8292ZN11A
C508	14-29	464
C509	14-24	P8292ZN11A
C510	14-25	MD19152J
C511	14-28	D6-202
C512	14-24	P8292ZN11A
C513	14-26	MD20128G
C514	14-23	P88N20000MMF200-10
C515	14-27	466
C516	14-24	P8292ZN11A
C517	14-24	P8292ZN11A
C518	14-30	ED.01
C524	14-33	65P47304
C701	13-17	0536-000-4R
C702	13-43	HFT65A
C703	13-17	0536-000-4R
C704	13-46	811-123
C705	13-46	811-123
C706	13-46	811-123
C707	13-43	HFT65A
C708	13-40	4700CH
C709	13-27	1000-101
C710	13-28	1000-102
C711	13-12	P8292ZN11A
C712	13-12	P8292ZN11A
C713	13-15	4700CB
C714	13-15	4700CB
C715	13-17	0536-000-4R
C716	13-17	0536-000-4R
C801	7-8	331000U2M250K
C802	7-6	69001-0500
C901	3-28	1000-106
C902	3-26	1000-106
C903	3-21	4700CH
DS1	8-8	47
DS2	8-8	47
DS3 thru DS10	5-11	GE2P
FL201	11-12	823-018

REFERENCE DESIGNATION	FIGURE & INDEX NO.	PART NUMBER
FL202	11-12	823-018
FL601	8-89	823-018
FL602	8-89	823-018
FL603	8-89	823-018
F1	17-9	312002
F2	17-10	313.100
F3	17-10	313.100
J1A	5-58	UG-657/U
J1B	17-19	UG-657/U
J2A	5-58	UG-657/U
J2B	17-19	UG-657/U
J3A	5-58	UG-657/U
J3B	17-19	UG-657/U
J4	2-10	183-222
J5	3-12	UG-657/U
J6	3-12	UG-657/U
J7 thru J10	6-27	UG-657/U
J11	17-59	13220
J12	8-18	184-018
J13	12-12	S315EB
J14	12-12	S315EB
J15	17-60	S304AB
J16	17-58	S306AB
J17	17-57	2675
J18	17-59	13220
J101	3-14	UG-657/U
J102	3-14	UG-657/U
J103	3-10	221-110
J104	3-10	221-110
J301	16-32	F126
J302	16-33	2675
J401	15-56	UG-657/U
J402 thru J404	15-57	3501FP
J501A	5-58	UG-657/U
J501B	14-39	UG-657/U
J502 thru J504	14-40	3501FP
J506A	5-58	UG-657/U
J506B	14-37	XLR3-32
J507	14-40	3501FP
J701	13-3	UG-657/U
J702	13-3	UG-657/U
J703	13-3	UG-657/U
J801	7-11	UG-657/U
J802	7-11	UG-657/U
J803	7-11	UG-657/U
J901	3-14	UG-657/U
J902	3-14	UG-657/U
J903	3-9	101
J904	3-9	101
K1	14-34	GA11D
K2	17-47	GA11D
K3	16-30	GA11D
L1 thru L4	17-49	C2304
L203	11-11	156-089
L204	11-11	156-089
L205	11-11	156-089
L401	15-46	156-440
L402	15-47	156-441
L404	15-45	156-458
L405	15-49	156-457
L406	15-44	156-443
L407	15-43	156-442
L408	15-43	156-442
L409	15-50	156-459
L410	15-42	156-442A
L411	15-41	156-444
L412	15-40	156-445
L413	15-39	156-446
L414	15-51	156-460
L601	8-87	1000-124
L701	13-42	215-124
L702	13-44	1000-103
L703	13-45	1000-104
L704	13-45	1000-104
L705	13-47	201-022
L706	13-45	1000-104
L707	13-45	1000-104
L708	13-18	263TC
L709	13-18	263TC
L801	7-3	221-201
M301	5-21	MM2-100MA
P1	6-12	P304CCT
P3	17-7	2770K
P4	13-1	2770K
P5 thru P7	8-43	UG-88/U
P8 thru P14	2-9	UG-88/U
P15	8-48	P306CCT
P16	12-11	P315FHT
P17	5-65	102
P18	5-65	102
P301	16-34	13219
P302	5-22	M61
P401	15-10	P304CCT
P402	5-31	3502
P403	5-31	3502
P404	5-31	3502
P501	14-7	13219
P502	2-91	31-206
P503	2-91	31-206
P504	5-31	3502
P505	2-16	31-206
P701	2-9	UG-88/U
P702	2-9	UG-88/U
P703	2-18	UG-88/U
P803A	2-9	UG-88/U
P803B	2-90	UG-88/U
Q1	14-1	2N1224
Q2	14-1	2N1224
R1	17-33	EB2201
R2	17-33	EB2201
R3	17-35	EB33G5
R4	17-30	FRL10-5000
R5	17-31	FRL10-10000
R6	17-28	JL68831
R7	17-24	GB4345
R8	5-33	118-047
R9	5-28	JA2N056P104AA
R10	5-72	118-082
R11	17-36	EB2241
R13	17-29	1-3/4D48F17500
R14	5-26	118-084
R15	17-25	FRL10-300
R16	17-37	EB1041
R17	17-37	EB1041
R21 thru R24	5-33	118-047
R25 thru R27	17-23	EB3301
R28	5-24	118-085
R29	17-21	118-088
R32	5-45	EB5651
R33	5-47	EB3351
R34	5-48	EB5641
R35	5-49	EB3055
R36	5-46	EB1851
R37	5-44	J82182
R38	5-50	EB1061
R39	5-51	EB4751
R40	5-52	EB1345
R41	17-34	GB1005
R64	17-27	EB7535
R65 thru R67	2-30	EB3505
R101	3-6	EB3015
R102	3-8	EB1011
R103	3-6	EB3015
R201	11-19	EB1011
R202	11-18	EB4721
R301	16-13	EB4711
R302	16-13	EB4711
R303	16-10	EB1541
R304	16-12	118-087
R306	16-24	EB1845

REFERENCE DESIGNATION	FIGURE & INDEX NO.	PART NUMBER
R307	16-18	EB3941
R308	16-15	EB1041
R310	16-9	EB33G1
R311	16-11	EB4741
R312	16-9	EB33G1
R313	16-15	EB1041
R314	16-7	118-083
R315	16-16	EB1021
R316	16-16	EB1021
R317	16-24	EB1845
R318	16-24	EB1845
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